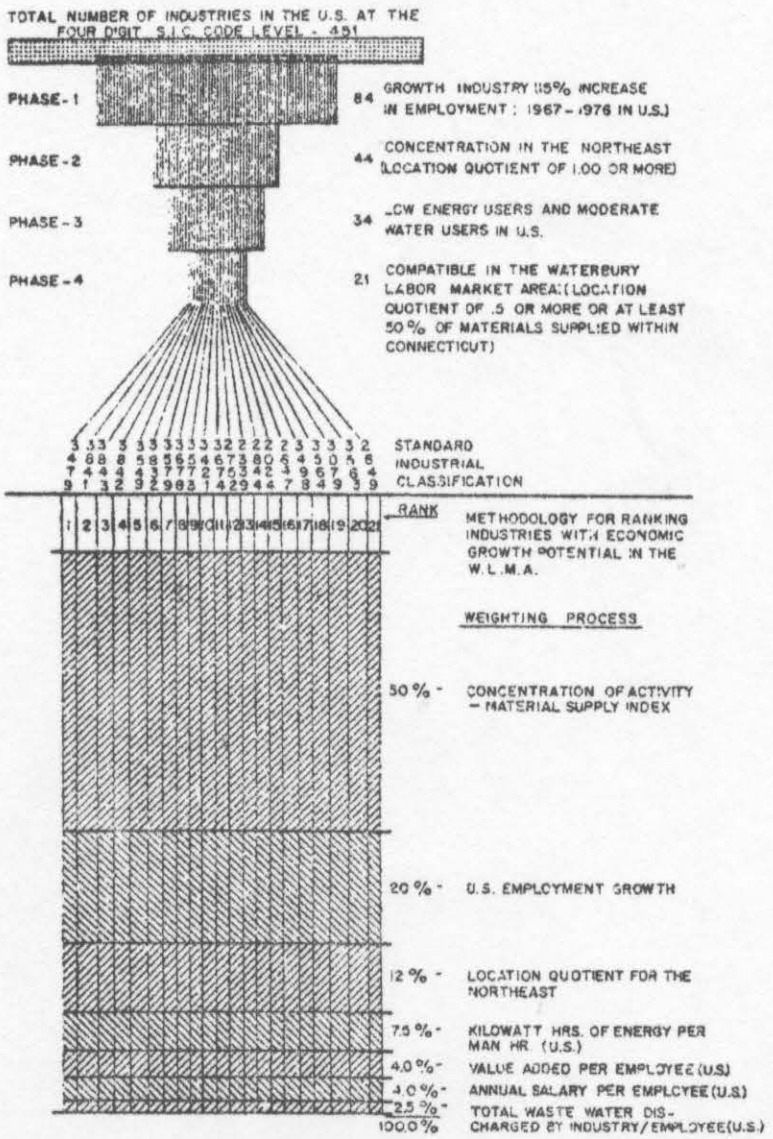
THE LOCATIONAL ADVANTAGE OF THE WATERBURY LABOR MARKET AREA:

21 INDUSTRIES WITH GROWTH POTENTIAL

JULY 1979

CENTRAL NAUGATUCK VALLEY
REGIONAL PLANNING AGENCY
20 EAST MAIN STREET
WATERBURY, CONN. 06702

SELECTION METHODOLOGY FOR DETERMINING INDUSTRIES WITH ECONOMIC GROWTH POTENTIAL IN THE W.L.M.A.



THE REGION WITH A PLAN FOR THE FUTURE

CENTRAL NAUGATUCK VALLEY REGIONAL PLANNING AGENCY

KATHERINE CAMPBELL, CHAIRMAN
DUNCAN GRAHAM, EXECUTIVE DIRECTOR

July 2, 1979

Mr. Frank Fulco, President
Greater Waterbury Chamber of Commerce
32 North Main Street
Waterbury, CT 06702

Dear Mr. Fulco:

On behalf of the Agency I am pleased to transmit this report on the Locational Advantage of the Waterbury Labor Market Area: 21 Industries with Growth Potential. This landmark economic analysis for our Region should provide the necessary background for the Chamber's continued and successful economic development efforts for this Region. We pledge our continued assistance in these efforts and specifically thank the Chamber for their financial support which in great part make this work possible.

Sincerely,

Katherine Campbell

Katherine Campbell
Chairman

C:s

20 EAST MAIN STREET WATERBURY CONNECTICUT 06702 TELEPHONE (203) 757-0535

TITLE:	The Locational Advantage of the Waterbury Labor Market Area: 21 Industries with Growth Potential
AUTHOR:	Central Naugatuck Valley Regional Planning Agency
SUBJECT:	An identification of industries with growth potential which are compatible and have strong locational advantages in the Waterbury Labor Market Area.
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ABSTRACT:	This report identifies 21 industries with growth potential in the Waterbury Labor Market Area (WLMA). The report discusses the possible secondary economic impacts associated with the 21 industries and provides policy guidelines for local and regional economic development planners. Finally, the report analyzes recent economic trends in the Waterbury Labor Market Area and identifies growth industries, causes of growth, spinoffs of growth and the origin of new economic growth in the WLMA.

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The preparation of this report was principally the responsibility of Charles Vidich, Regional Planner.

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SUMMARY OF FINDINGS

Major Findings

Despite recent declines in manufacturing employment in the Waterbury Labor Market Area the Region has a strong locational advantage for 21 industry groups which have shown long-term growth at the national level. The 21 industry groups listed on Table 13 were identified using a series of national economic indicators derived from the U.S. Census of Manufactures and a special indicator developed from a 1978 Post College*study of business and industry in the Waterbury Labor Market Area.

The methodology used to identify industries with growth potential in the WLMA established a four phase, step-down selection process which focused regional economic development efforts upon the following: (1) industries experiencing a net employment growth of 15% or more in the United States over the period 1967 to 1976, (2) industries which are more concentrated (in terms of employment) in the Northeast than in the nation, (3) industries which are low energy users (less than 75 kilowatt hours per man-hour of production) and discharge only moderate quantities of waste water (less than 500,000 gallons of waste water per employee per year), (4) industries which are expected to have a high reliance on materials purchased within Connecticut (industries which could be expected to purchase at least 50% or more of their materials within Connecticut) or are already concentrated or show signs of becoming concentrated in the WLMA (industries which could be expected to be producers of export oriented goods if they choose to locate in the WLMA).

The 21 growth industries selected were then ranked using the four criteria incorporated into the selection phase with the addition of two variables measuring annual salary per employee and value added per employee. The assumption behind the weighting process was that the greatest weight should be placed upon the factor which was most significant in determining the locational advantage of the WLMA.

*Located in Waterbury, Connecticut

Consequently, the highest weight (50% of the total) was given to the concentration of activity - material supply index. The next most significant factor in the weighting process was employment growth (20% of the total) which was considered to be more important than environmental considerations (10% of the total) and more important than the concentration of each industry in the Northeast (12% of the total). The fact that employment growth was given less weight than the concentration of activity - material supply index does not indicate that it was given a lesser weight since the study initially selected out only industries which had had a 15% increase in employment over the period 1967 to 1976.

The rankings should be used with caution since the rank of an individual industry is less significant than the rankings of groups of industries. In effect, it would be inappropriate to state that industry ranked number 1 is necessarily a higher priority for the WLMA than industry ranked number 2. However, it would be appropriate to state that the top five ranked industries have a greater priority than the bottom five ranked industries.

Findings related to secondary impacts

The study also identified significant positive and negative secondary impacts associated with the 21 industry groups. Eight major secondary impacts were explored to determine the most desirable industry groups for the Waterbury Labor Market Area. The study found that certain industries can be expected to have a more positive impact upon the growth of existing industry and upon the stability of the local economy. The eight secondary impacts that were considered are as follows:

1. achieving import substitution
2. establishing economic linkages with related industry
3. developing threshold effects
4. creating internal specialization among dominant industry

5. maximizing export related production
6. stimulating product innovation
7. diversifying manufacturing activities
8. minimization of structural unemployment

Each of the 21 growth industries is expected to have its own secondary impacts upon the Waterbury Labor Market Area economy (see Table 16). Consequently, the choice of industries to attract to the WLMA must also consider which secondary impacts the Region wishes to optimize. In particular, the study indicates that the Region should seriously consider (1) maximizing its export related production, (2) diversifying its manufacturing activities, (3) encouraging the growth of industries with economic linkages with dominant industry in the WLMA, and (4) maximizing the local production of manufactured goods which are currently imported from outside the Region.

Other Findings

In order to support the methodological assumptions used in the study, the CNVRPA staff conducted a computer analysis of the data collected by Post College on manufacturing firms in the WLMA. The analysis covered 575 of the estimated 777 manufacturing firms in the WLMA, covering approximately 98.1% of the total manufacturing employment in the Labor Market Area. The study found that in 1978, 79 of the 143 industry groups in the United States at the 3 digit level of Standard Industrial Classification were represented in the WLMA. However, 40 industry groups accounted for 95% of all the manufacturing employment in the WLMA and the top ten industry groups accounted for 66% of all employment. The ten dominant industry groups (in terms of employment) were manufacturers of metal forgings and stampings (SIC Code 346), watches, clocks and watchcases (SIC Code 387), screw machine products, bolts (SIC Code 345), costume jewelry and notions (SIC Code 396), metalworking machinery (SIC Code 354), miscellaneous chemical plants (SIC Code 289), tires and inner-tubes (SIC Code 301), and engineering and scientific instruments (SIC Code 381).

Significantly, with the exception of those manufacturing watches, clocks and watchcases and tires and inner-tubes, the ten dominant industries in the WLMA belong to industries which have been declining in employment nationally during the period 1967 to 1976. This finding underscores the importance of diversifying the Region's economy by expanding employment among sub-dominant industry groups or attracting growth industries with linkages to the dominant but declining industry groups in the WLMA.

The study also found that the Region's economy may still be susceptible to sudden economic dislocations because of the concentration of employment in a handful of large firms. In 1978, 16 firms in the WLMA accounted for about 35% of all employment and only 3 of these firms belonged to industry groups which experienced increases in employment at the national level during the period 1967 to 1976. The concentration of employment in a handful of large firms may suggest that efforts directed at diversification of the manufacturing sector should also be coupled with an emphasis on attracting smaller sized firms or in assisting larger firms to "break out" some of their internal product specializations into new establishments.

The Waterbury Labor Market Area is one of the significant centers in the Northeast for the manufacture of screw machine products (SIC Code 345), metal forgings and stampings (SIC Code 346), metalworking machinery (SIC Code 354), watches, clocks and watchcases (SIC Code 387) and needles, pins and fasteners (SIC Code 3964).

In 1972, the Waterbury Standard Metropolitan Statistical Area (SMSA)* accounted for over 23% of all employment (in the Northeast) in the watches, clocks and watchcases industry, slightly over 14% of all employment in the needles, pins and fasteners industry, about 6% of all employment in the screw machine products industry, over 4% of all employment in the metal forgings and stampings industry and about 2% of all employment in the metalworking machinery industry.

*See Page 10 for a Map of the Waterbury SMSA.

Not surprisingly, the agglomeration of manufacturing activity among these five industry groups has established these industries as "basic" industry groups in the WLMA. According to the economic base theory industries which are producing goods for export markets are considered "basic" since they are most likely to increase the net inflow of money into the Region. In contrast, non-basic industries are primarily producing goods for local markets and consequently will not have as favorable an impact on the balance of payments between this Region and other regions in the nation or the world.

Despite recent declines in manufacturing employment, net income growth rates have been quite high in some industries in the WLMA. The CNVRPA found that 58 manufacturing firms in the WLMA had net income growth rates of 20% or more during the period 1973 to 1978. The principal industries experiencing the greatest increases in net income were the manufacturers of fabricated metals, machinery [except electrical] and electric and electronic equipment. These three industries accounted for almost 64% of all the fastest growing industries in the WLMA.

However, manufacturers of fabricated metals and machinery [except electrical] also accounted for nearly 74% of all the firms with a decline in net income in the WLMA. These divergent growth patterns within the same industry categories, to some extent, appear to reflect the sharp competition found among these two dominant industry groups. Indeed, in 1978 these two industry groups accounted for nearly 60% of all manufacturing establishments with 5 or more employees in the WLMA.

Two significant factors have influenced the rate of net income growth in the WLMA: defense contracts and the extent to which manufacturing firms rely on Connecticut sources for their raw materials and supplies. It is generally assumed that industries will be able to lower their operating and transport costs by locating closer to their source of raw materials. The Central Naugatuck Valley Regional

Planning Agency (CNVRPA) found that there was a strong statistical relationship between net income growth rates and the percent of materials purchased by local industry from within Connecticut. Half of the fastest growing industries in the WLMA purchased 60% or more of their materials or supplies within Connecticut. In contrast, 70% of the firms experiencing a decline in net income purchased less than 60% of their materials from within Connecticut.

Similarly, the study found that some firms have probably had faster rates of net income growth due to their heavy reliance on defense contracts. In 1978, the average manufacturing firm attributed 3.6% of its work to defense related activities. However, on the average, fast growth firms attributed 6.3% of their work to defense contracts. Not surprisingly, the fastest growing industry in the WLMA - manufacturers of electric and electronic equipment - had the highest reliance on defense contracts. In 1978, the average electric and electronic equipment firm attributed 21.5% of its work to defense contracts.

Employment growth generated by industry which has recently moved to the WLMA provides a valuable perspective on the perceived locational advantages of the WLMA for different types of industries. During the last 5 years five major industry categories (at the 2 digit SIC Code level) accounted for nearly 3 out of every 4 new firms entering the Region. By far the largest two industry categories (at the 2 digit SIC Code level) were manufacturers of fabricated metals (39.6%) and machinery [except electrical] (12.4%) which together accounted for about 52% of all new firms. Within these two industry categories the most frequent specific industry groups (at the 3 digit SIC Code level) locating in the WLMA have been manufacturers of screw machine products (20.6%) and metalworking machinery (11.6%). These findings indicate that while new firms are probably attracted to the economies of scale associated with agglomeration in the fabricated metal and machinery industries, the attraction of these industries is tending to reinforce the Region's over-specialization in two industry categories which are declining at the national level.

Significantly, firms originating from out-of-state accounted for only a small fraction of the total number of new firms entering the Region or the state during the last five years. Only 3% of all new Connecticut firms and about .6% of all new firms in the Central Naugatuck Valley Region came from out-of-state. Those firms which came from out-of-state typically made short moves from the larger metropolitan areas of New York or Boston. Indeed, the metropolitan New York area alone accounted for 57% of all out-of-state firms entering Connecticut in the last five years. These findings are consistent with the theory of uncertainty in location choice which states that industry executives tend to optimize their location within the limited sphere of knowledge and information available to them. Rather than choosing among all possible ideal locations, industry executives tend to choose the optimum location within a limited geographic area. In practice this has meant that few if any firms from out-of-state relocate in Connecticut. But of those that do, 85% have originated in a nearby state in the Northeast (New England, New York, New Jersey and Pennsylvania).

CHAPTER I

Location Theory

Businessmen, economists and planners have long been concerned with identifying those factors unique to a geographic area which may provide competitive advantages for industry. The assumption behind most location decisions is that an industry can reduce its costs of doing business and optimize its profits by choosing the site offering the most favorable economic advantages. Generally, the factors considered important in classic location theory have been the cost of transportation, the location of the raw materials and the market for the finished product. However, as location theory has evolved it has gradually begun to consider other broad location factors such as the cost of labor, energy supplies and cost, the availability of utilities, state and local taxes, land and construction costs, and local site conditions. Furthermore, the most recent studies in location theory are considering other non-pecuniary variables such as personal location preferences of those making the decisions to move, quality of life issues, uncertainty principles reflecting the lack of information available to those making industrial location decisions and government regulations which can promote or discourage industrial development.

Over the last eighty years, location theorists have developed over a dozen different theories to explain why industry chooses to locate where it does and why industrial location decisions are not always consistent with location theory. The most significant theories of industrial location factors are discussed below:

1. The theory of location factors

The basic concept behind all of the theories is that certain geographic areas tend to develop certain types of industry more rapidly than others due to the natural advantages created by access to rivers, major highways, major natural or man-made resources or to market areas. The earliest theory of industrial

location, called the least cost theory,[1] held that the major variable in location decisions are the location of raw materials, labor and the cost of transportation. This theory emphasized that local cost factors related to production were the primary criteria used in choosing the best location for industry. Using this approach a firm would try to locate in an area which offered on the average the least expensive costs for labor, transportation and materials. The least cost theory was later expanded into the maximum profit theory which emphasizes that the total costs of doing business must be related to the potential sales market for an industry since a firm's ultimate objective in choosing a location is to make a profit.[2] The maximum profit theory emphasized that the demand factor is variable and in part explains why larger urban areas attract greater numbers of industries and why there is a hierarchy of services and industrial activities within any spatial economy.

More recently, location theorists have expanded the factors influencing location decisions to include an analysis of the economies of scale that develop when industries concentrate in one location, an evaluation of the market as a location factor and an analysis of the types of cities which attract specific types of industries.

The growth center theory, the locational interdependence theory, the economic base theory and agglomeration theory[3] are extensions of the individual industry analysis associated with the least cost and maximum profit theories. The basic assumption behind these four theories is that certain locations develop competitive advantages for specific industries as a result of the agglomeration of similar industries or industries with common linkages. Rather than merely identifying the locational advantages of a firm to its market, raw materials, labor and transportation costs, these theories emphasize that other similar industries or industries with linkages can be extremely important in the decision of where and where not to locate. Industries which are linked in business are attracted to each other but industries

which are competitive will also be influenced by the locational decisions of other firms (locational interdependence theory). Under the locational interdependence theory competition with other firms producing similar products can lead to an agglomeration of industries at the center of the market where access to the consumer and necessary services is greater or it can lead to a division of the market among all competitors. In either case, this theory assumes thatlocation decisions of one firm are not only affected by the size of the market to be served but by the location decisions of other firms producing similar products. Another extension of this analysis is that industries tend to agglomerate close to dominant industries which provide the raw materials for their products and where there is a high degree of accessibility to services (growth center theory). Agglomeration of industries producing similar products leads to a saturation of the local market for goods, thereby stimulating export oriented sales (economic base theory).

In terms of economic base theory, the most significant factor to be considered is not the size of the firm or the number of its employees but the percentage of its total value of shipments which are for export markets.* The agglomeration theory emphasizes that competitive advantages accrue to industries in large urban areas as a result of the external economies of scale associated with supporting services, inter-industry linkages and markets in cities familiar with the manufacturing activities of a particular firm. This theory in large part explains why most small firms in the United States are born in the urban centers where existing services and facilities reduce the general overhead of establishing a new business.

Finally, recent studies have shown that most industrial location decisions are usually not made with a full understanding of all the best options. According to the uncertainty or behavioral theory, rather than seeking the ideal location, many executives choose to optimize their location within their limited sphere of knowledge, the limited geographic area with which they are familiar and their

*"export markets" refers to any shipments destined for locations outside of the immediate labor market area.

limited understanding of the activities of competing industries. The obvious implication of this theory is that regional strategies aimed at attracting new industry should stick close to home to maximize their success.

2. Regional location factors

The purpose of this study is to identify the specific locational advantages of the Waterbury Labor Market Area (WLMA)* for industries which are expected to have the most optimistic prospects for long term growth as measured by employment. Modern industrial location theory has been synthesized in this study in order to identify the regional advantages of the WLMA for detailed industry categories. The contributions of the least cost theory have been incorporated into this study by an evaluation of the growingly important costs of energy and transportation. The growth center theory has focused this study's efforts upon dominant industries (in terms of employment) and industries showing signs of becoming dominant which also are the fastest growing industries in terms of employment. The contributions of the economic base theory, the theory of uncertainty in location choice and the locational interdependence theory have narrowed the focus of this study to industries which are (1) likely to be easily attracted to the WLMA, (2) which would be most likely to have the greatest multiplier effect upon employment and income levels in the WLMA and (3) which are linked with industries currently located in the WLMA.

The validity of these specific theoretical assumptions as they relate to the selection of compatible industry are broadly discussed in Chapter II, Chapter IV, and Chapter VI.

*The Waterbury Labor Market Area includes the municipalities of Bethlehem, Beacon Falls, Cheshire, Middlebury, Naugatuck, Prospect, Southbury, Thomaston, Waterbury, Watertown, Wolcott and Woodbury. See Map on page 10.

In Chapter II the study identifies the growth and declining industries in the WLMA, Chapter III describes development policies which may limit the type of industry suitable for the Region, Chapter IV presents a methodology for selecting economic growth priorities for detailed industry categories, Chapter V identifies growth products which may be compatible with the manufacturing activities of industries in the WLMA and Chapter VI provides broad criteria for evaluating the secondary impacts of the industries identified as suitable for the Waterbury Labor Market Area.

FOOTNOTES

[1]E. Willard Miller, Manufacturing: A Study of Industrial Location, The Pennsylvania State University Press, London, PA, 1977. See Chapter 1, "Industrial location theory" for an excellent discussion of the major theories of industrial location.

[2]David M. Smith, Industrial Location: An Economic Geographic Analysis, John Wiley & Sons, Inc., New York, 1971. See Chapter 8, "Industrial Location Theory: the Economist's Contribution."

[3]E. Willard Miller, Manufacturing: A Study of Industrial Location, the Pennsylvania State University Press, London, Pa, 1977, pp. 25-41.

[4]Michael J. Webber, Impact of Uncertainty on Location, The MIT Press, Cambridge, MA, 1972. See Chapter 5, "Decision making in uncertainty" for an analysis of uncertainty theory in the decision making process of industry executives.

CHAPTER II

Industry Trends in the Waterbury Labor Market Area (WLMA)

Past employment trends of local industry can provide an important measure of the potential locational advantages of the WLMA. Firms which are growing locally may indicate that other firms producing the same or similar products may also benefit by the factors which make the WLMA a good location for a given industry. This approach is essentially founded on the economic base and growth center theories which postulate that agglomeration of manufacturing activities in urban areas reflects certain locational advantages unique to the area. In turn, the process of agglomeration itself becomes a criteria which industries may use in considering the location for their firm. Agglomeration is caused by the attraction of manufacturing activities linked to the dominant industries in a given urban area (growth center theory) and by the expansion of sales markets reflected in a greater export of locally manufactured goods to other regions once local needs are met (economic base theory).

This chapter identifies the growth industries in the WLMA, pinpoints the factors influencing local growth trends and describes the magnitude and type of growth due to the establishment of new firms. These trends provide the rationale for the criteria and methodology developed for the selection of growth industries.

1. A profile of employment trends in the manufacturing sector

During the period January 1970 to April 1978 the Central Naugatuck Valley Region* experienced a net loss of over 5000 jobs in the manufacturing sector. Part of the explanation for the significant decline in local manufacturing employment can be attributed to the national pattern of declining manufacturing employment.

*Beacon Falls, Bethlehem, Cheshire, Middlebury, Naugatuck, Oxford, Prospect, Southbury, Thomaston, Waterbury, Watertown, Wolcott, and Woodbury. See Map on page 10.

Between 1967 and 1976 the United States had a decline of 7.0% in the number of persons employed in the manufacturing sector.[1] However, during the same period the Waterbury Labor Market Area experienced a 17.1% decline in manufacturing employment.[2] The greater decline in manufacturing employment in the WLMA than in the nation is partly a function of the WLMA's over-specialization in several declining industries, although other factors such as a marked decrease in defense contracts following the Vietnam War have also had a significant effect. The principal industries which have experienced the greatest loss of employment have been those which rely on raw materials that originate from distant sources, including manufacturers of primary metals, rubber, chemicals and plastics.

While there has been an overall decline in manufacturing employment in both the nation and the Waterbury Labor Market Area it would be a mistake to assume that all industries within the manufacturing sector have declined.

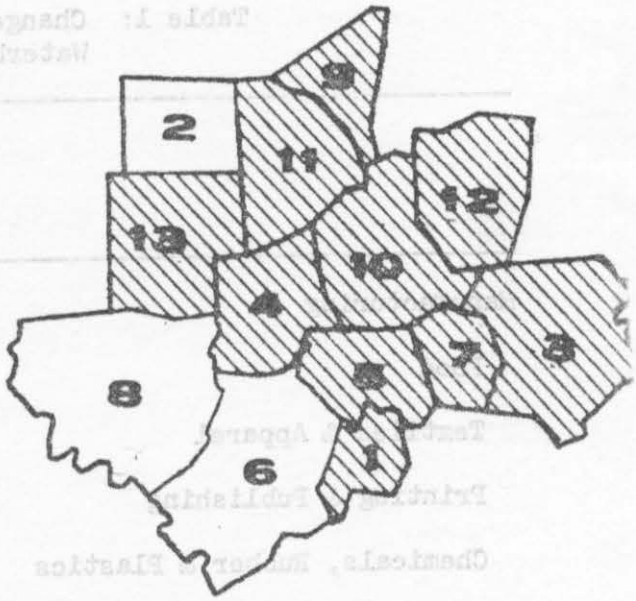
Based on data supplied by the Connecticut Department of Labor there are four industry groups in the WLMA which have experienced an increase in employment over the period 1967 to 1977. These include manufacturers of food, textiles and apparel, electrical equipment and instruments and related products (see Table 1). However, only one of these major industry groups - manufacturers of electrical equipment - had a significant growth in employment in the WLMA. At a more detailed industry level the Connecticut Department of Labor data indicates that while manufactures of instruments and related products (SIC Code 38)* had a nominal employment growth rate of 2.2% over the period 1967 to 1977 a subcategory of this industry -

*The Standard Industrial Classification Code has been developed by the U.S. Office of Management and Budget as a means of classifying industries according to the products they manufacture. Using the SIC Code, comparisons can be made at a broad or a detailed product category. Two digit SIC Codes (e.g., 33 = primary metals) refer to major industry categories, 3 digit SIC Codes (e.g., 332 = iron and steel foundries) refer to major sub-industry groups and 4 digit SIC Codes (e.g., 3321 = gray iron foundries) refer to specific industries and associated products.

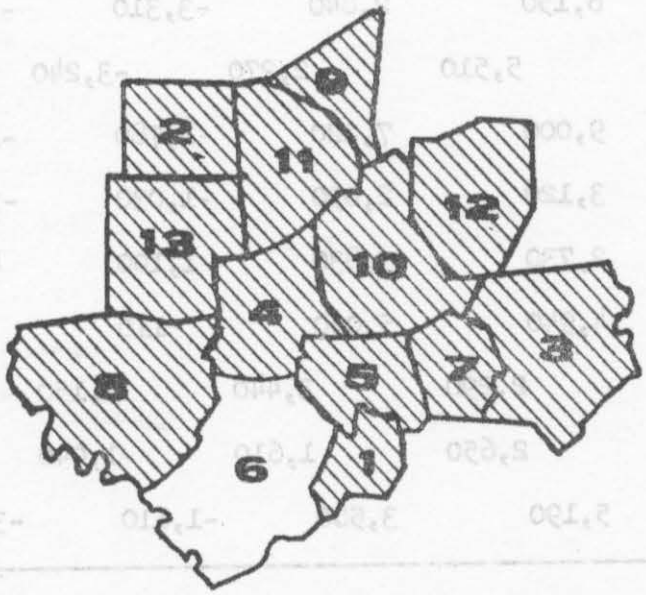
Table 1: Changes in Industrial Employment in the Waterbury Labor Market Area: 1967-1977

	Annual Average Employment 1967	Annual Average Employment 1977	Employment Change	Percent
Manufacturing	40,450	33,500	-6,950	-17.1
Food	1,110	1,150	40	3.6
Textiles & Apparel	1,350	1,390	40	2.9
Printing & Publishing	940	680	-260	-27.6
Chemicals, Rubber & Plastics	5,920	5,670	-250	-4.2
Primary Metals	6,150	2,840	-3,310	-53.8
Brass	5,510	2,270	-3,240	-58.8
Fabricated Metals	9,000	7,220	-1,780	-19.7
Machinery	3,120	2,090	-1,030	-33.0
Electrical Equipment	2,730	3,830	1,100	40.2
Instruments & Related Products	4,940	5,050	110	2.2
Clocks & Watches	2,290	3,440	1,150	50.2
Instruments	2,650	1,610	-1,040	-39.2
Other Manufacturing	5,190	3,580	-1,610	-31.0

Source: Connecticut Labor Department, Employment Security Division, October 1978.



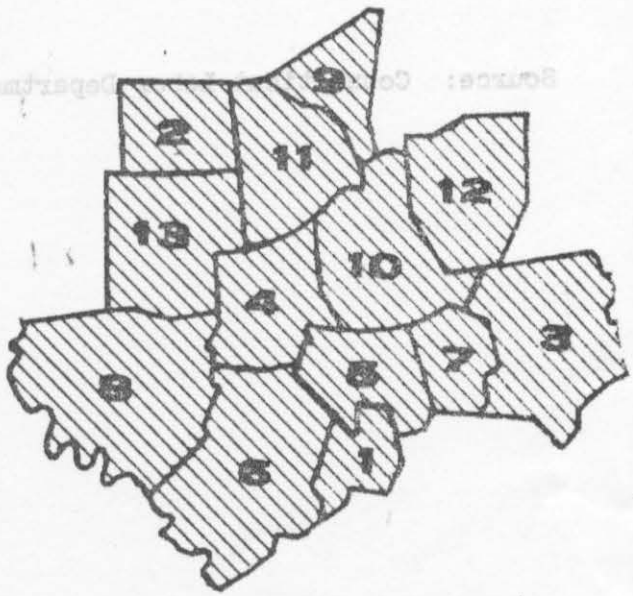
WATERBURY
STANDARD METROPOLITAN
STATISTICAL AREA
(1972 SMSA Definition)



WATERBURY LABOR MARKET AREA

LEGEND

1. BEACON FALLS
2. BETHLEHEM
3. CHESHIRE
4. MIDDLEBURY
5. NAUGATUCK
6. OXFORD
7. PROSPECT
8. SOUTHBURY
9. THOMASTON
10. WATERBURY
11. WATERTOWN
12. WOLCOTT
13. WOODBURY



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manufacturers of clocks and watches (SIC Code 3873) - had a 50% increase in employment during the same period. While disclosure provisions of the Connecticut Department of Labor make it impossible to evaluate employment growth trends of all detailed industry categories in the WLMA at the three or four digit standard industrial classification level, a survey of business and industry conducted by Post College in the WLMA during 1977 and 1978 provides some valuable information on employment growth and net income growth rates of more detailed industry categories. The Post College survey was nearly a complete survey of all business and industry in the WLMA covering a total of 575 industries* including 347 manufacturing firms with 5 or more employees. The 347 firms having 5 or more employees were asked a series of detailed questions concerning their employment, net income growth rate, source of raw materials and other economic indicators. However, the survey does not provide reliable employment trend data for industry categories largely because much of the decline in employment experienced in the WLMA has been due to the death or departure of manufacturing firms such as Chase Brass & Copper which were in existence in 1970 but were no longer in existence in 1978. Nonetheless, the survey does provide reliable information on current employment trends for those industries which have been in existence over the period 1970 to 1978. As such, the Post College survey not only offers significant measures of the employment growth rates of individual firms, but it allows for a more detailed and sophisticated economic base study of the WLMA than would be possible using data from the Connecticut Department of Labor.

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*The Greater Waterbury Chamber of Commerce estimates that there were approximately 666 manufacturing firms in the Central Naugatuck Valley in 1978. However, as a result of the Post College survey, the Chamber of Commerce has identified nearly 100 additional small firms which had hitherto not been included in the Chamber's Manufacturer's Directory. The only significant firms omitted in the Post College survey were Timex (2770 employees), Tech Systems (367 employees), and Alloy Foundries (332 employees). Employment data for these three industries was collected through a Chamber of Commerce and a CNVRPA survey of major industries conducted in the fall of 1978. All told, the augmented survey identified 31,434 persons as being employed in the manufacturing sector during fiscal year 1977-1978. This represents 98.1% of all manufacturing employment in the WLMA in January 1978 according to statistics provided by the Connecticut Labor Department.

Table 2 indicates that several industries in the WLMA surveyed by Post College had exceptionally fast and significant employment growth rates between 1970 and 1978. These include electric and electronic equipment (SIC Code 36), paper and allied products (SIC Code 26), miscellaneous manufacturing activities (SIC Code 39), printing and publishing (SIC Code 28), plastic products (SIC Code 30), and weaving mills (SIC Code 22).

With the exception of manufacturers of plastic products and printing and publishing concerns, the Connecticut Department of Labor data for the period 1970 to October 1978 supports the employment growth trends of these major industry categories. The fact that not all industries were surveyed by Post College may account for the discrepancy in the employment growth trends found for these two industry groups in the 1978 survey and the employment data of the Connecticut Department of Labor. However, another critical factor that may be causing the discrepancies is the demise of firms in certain industries which could very well lead to an increase in the employment levels of firms within the same industry as they begin to assume responsibility for production of many of the goods manufactured by the departed firms. In effect, some of the employment growth revealed in the Post College survey for declining industries may very well reflect decreased competition within the industry.

2. Dominant industry groups in the WLMA: Employment

In 1978 Post College found that of the 143 industry groups in the United States at the three digit level of the Standard Industrial Classification, 79 were represented in the Waterbury Labor Market Area. Moreover, based on the Post College study, 40 industry groups accounted for 95% of all the manufacturing employment in the WLMA with 10 of those industry groups accounting for 66% of all manufacturing employment (see Table 3). The ten dominant industry groups in terms of employment include metal forgings and stampings (SIC Code 346), watches, clocks and watchcases

Table 2: Growth in Manufacturing Employment in the Waterbury Labor Market Area by Standard Industrial Classification Code: 1970-1978

SIC Code	Industry Description	Increase in Employment 1970-1978	Average Increase in Number of Employees Per Firm 1970-1978	Percent Change in Employment 1970-1978	Number of Firms Surveyed
20	Food and kindred products	228	16.2	30.2	14
22	Textile mills products	362	181.0	93.9	2
23	Apparel and textiles	19	1.7	3.1	11
24	Lumber and wood products	49	16.3	50.0	3
25	Furniture and furniture fixtures	122	40.6	46.9	3
26	Paper and allied products	227	56.7	945.8	4
27	Printing and publishing	197	8.9	131.3	22
28	Chemicals and allied products	-375	-62.5	-21.8	6
30	Rubber, miscellaneous plastics	2,010	143.0	663.3	14
32	Stone, clay and glass	119	19.8	113.3	6
33	Primary metals	-1,580	-197.5	-49.8	8
34	Fabricated metals	2,036	14.3	37.6	142
35	Machinery except electric	335	6.5	28.9	51
36	Electric and electronic	1,196	66.4	88.9	18
37	Transportation equipment	23	23.0	209.0	1
38	Instruments and related products	-614	-68.2	-28.7	9
39	Miscellaneous manufacturing	1,997	221.8	282.0	9
TOTAL		6,351	19.6	34.7	323

Source: Special cross-tabulation made by the CNVRPA based on data supplied by Post College Survey of Employment in the Waterbury Labor Market Area, November 1978.

(SIC Code 387), screw machine products, bolts (SIC Code 345), costume jewelry and notions (SIC Code 396), electronic components and accessories (SIC Code 367), nonferrous foundries (SIC Code 336), metalworking machinery (SIC Code 354), miscellaneous chemical products (SIC Code 289), tires and inner tubes (SIC Code 301), and engineering and scientific instruments (SIC Code 381).

Significantly, with the exception of those manufacturing watches, clocks and watchcases and tires and inner tubes, the ten dominant industries in the WLMA belong to industries which have been declining in employment nationally during the period 1967 to 1976. This finding clearly indicates that local and regional economic development efforts should be more geared toward expanding the employment growth of sub-dominant industries in the WLMA which are growing nationally or in attracting growth industries which have linkages to the dominant but declining industry groups in the WLMA than in attempting to halt any local manifestations of declining national manufacturing employment.

3. Dominant industry groups in the WLMA: Number of establishments

Concentration of industrial activity can also be measured in terms of the number of firms involved in the production of manufactured goods. Table 3 indicates that six industry groups accounted for almost 57% of all the manufacturing firms in operation in the WLMA during 1978. Three of these six industry groups were also among the top ten employers in the WLMA (metal forgings and stampings, screw machine products and bolts and metalworking machinery). In contrast, manufacturers of metal services, fabricated structural metal products and commercial printers only accounted for 4.8% of all manufacturing employment but represented nearly 15% of all manufacturing firms in operation in 1978.

The high degree of agglomeration of manufacturers of fabricated metal products, mechanical equipment, instruments and related products and miscellaneous manufacturing industries has made the WLMA one of the dominant centers in the Northeast for

Table 3: Industry Groups Concentrated in the Waterbury Labor Market Area: 1978

SIC Code	Industry Description	Average 1978 Employment	Number of Establishments	Location Quotient
346	Metal forgings and stampings	4,133	82	8.7
387	Watches, clocks, watchcases	3,122	3	99.0
345	Screw machine products, bolts	2,904	70	17.0
396	Costume jewelry and notions	2,629	5	32.2
367	Electronic components & accessories	1,607	12	2.8
354	Metalworking machinery	1,596	74	3.2
336	Non-ferrous foundries	1,372	3	10.7
289	Miscellaneous chemical products	1,112	2	8.7
301	Tires and inner tubes	1,100	1	6.8
381	Engineering & scientific instruments	1,035	5	16.0
306	Fabricated rubber products NEC	816	2	5.0
347	Metal services NEC	788	22	5.0
366	Communication equipment	622	3	0.8
384	Medical instruments & supplies	523	4	2.7
335	Non-ferrous rolling & drawing	475	6	1.6
207	Fats and oils	430	2	6.8
233	Women's and misses' outerwear	403	8	0.5
307	Miscellaneous plastic products	399	15	0.6
344	Fabricated structural metal products	372	24	0.5
341	Metal cans and shipping containers	367	1	3.0
228	Yarn and thread mills	352	1	1.3
225	Knitting mills	350	1	0.8
342	Cutlery, handtools, hardware	335	5	1.3
254	Partitions and fixtures	332	1	5.5
275	Commercial printing	325	40	0.6
205	Bakery products	311	3	0.8
364	Electric lighting and wiring equipment	279	4	1.0
265	Paperboard containers & boxes	251	4	0.7
251	Household furniture	231	4	0.4
232	Men's and boys' furnishings	209	2	0.4
373	Ship and boat building and repairing	189	1	0.6
259	Miscellaneous furniture & fixtures	160	1	5.1
202	Dairy products	154	5	0.5
243	Millwork, plywood & structural members	150	4	0.5
329	Miscellaneous non-metallic mineral products	140	3	0.8
355	Special industry machinery	110	5	0.4
284	Soaps, cleaners & toilet goods	105	2	0.6
234	Women's & children's undergarments	100	1	1.4
385	Ophthalmic goods	91	2	2.2
331	Blast furnace & basic steel products	81	7	0.1
281	Industrial inorganic chemicals	78	1	0.5
Total 40 Industry Groups		30,044	428	
All Industry Groups		31,434	575	

Source: Post College Survey of Business and Industry 1978 and CNVRPA revisions, January 1979. The CNVRPA revisions not only involved adding several firms which were not surveyed by Post College but reclassifying 54 surveyed firms employing 1,338 employees which had been misclassified in the original survey.

the production of screw machine products (SIC Code 345), metal forgings and stampings (SIC Code 346), metalworking machinery (SIC Code 354), watches, clocks and watchcases (SIC Code 387), and needles, pins and fasteners (SIC Code 3964). In 1972 the U.S. Census of Manufactures indicates that the Waterbury Standard Metropolitan Statistical Area accounted for almost 10% of all manufacturers of screw machine products, about 4% of all manufacturers of metal forgings and stampings, about 3% of all manufacturers of metalworking machinery, about 4% of all manufacturers of watches, clocks and watchcases and about 6% of all manufacturers of needles, pins and fasteners in the Northeast. Similarly, in 1972 the Waterbury Standard Metropolitan Statistical Area accounted for almost 6% of all the employment in the screw machine product industry, over 4% of all employment in the metal forgings and stampings industry, almost 2% of all employment in the metalworking machinery industry, over 23% of all employment in the watches, clocks and watchcases industry and slightly over 14% of all employment in the needles, pins and fasteners industry in the Northeast.

The relative abundance of small firms among the fabricated metal industry has tended to minimize some of the potential economic dangers of overdependence upon these firms. However, in the dominant but declining industry groups where employment in concentrated in a few firms, the Region continues to be vulnerable to possible sudden economic dislocations through the demise of large firms. Indeed, in 1978, 16 firms in the WLMA accounted for about 35% of all employment and only 3 of these firms belonged to industry groups which experienced increases in employment at the national level during the period 1967 to 1976.

The concentration of employment in a handful of large firms may suggest that efforts directed toward the diversification of the manufacturing sector should also be coupled with an emphasis on attracting smaller sized firms or in assisting larger firms to "break out" some of their internal product specialization into new manufacturing establishments. This approach would be consistent with E.F.

Schumacher's emphasis on the use of intermediate technology as a means of stimulating manufacturing activities requiring lower levels of capital investments to be productive.[3]

4. Basic industry groups in the WLMA

According to economic base theory it is also important to know whether an industry is producing goods for export out of the Region and not just how much employment is generated by a firm. The assumption behind economic base theory is that industries will export their goods when the demand for their goods is met locally. Saturating the local market leads industries to expand their sales markets, which in turn leads to a net inflow of money into the Region. Traditionally, economic base theorists have classified goods that are for export as basic and goods which are produced to satisfy the local market as non-basic in nature. Economic development planners generally emphasize the production of basic goods in order to increase the net inflow of money into a region and because the production of basic goods has a "multiplier effect" stimulating employment and income growth in other sectors of the economy.

The principal measure used to determine whether an industry is producing basic or non-basic goods is the relative employment level in the local labor force compared to the same industry's relative employment level in the national labor force. As an example, an industry which accounts for 5% of the WLMA's employment and 5% of the nation's employment would be given a location quotient of 1.0 (i.e., .05/.05 = 1.0). This generally indicates that the region is self-sufficient in this sphere of production but is not likely to be exporting any of their goods. In contrast, an industry which has a location quotient of more than 1.0 is said to be also producing basic goods which are geared toward an export market. However, one must bear in mind that an economic base analysis assumes equal levels of productivity and consumption at the local and national levels. Consequently, an industry which is more technologically advanced or has more

Table 4: Comparison of Net Income Growth Rates Among Major Industries in the Waterbury Labor Market Area with a Decline in Net Income and for those with a Net Income Growth of 20% or more: 1973-1978

SIC Code	Industry Description	Number of Firms with a Decline in Net Income	Percent	Number of Firms with Net Income Growth over 20% in Last 5 Years	Percent
20	Food and kindred products	1	5.3	2	3.4
22	Textile mills products	0	0.0	0	0.0
23	Apparel and Textiles	1	5.3	2	3.4
24	Lumber and wood products	1	5.3	1	1.7
25	Furniture and furniture fixtures	0	0.0	1	1.7
26	Paper and allied products	0	0.0	1	1.7
27	Printing and publishing	0	0.0	4	6.9
28	Chemicals and allied products	0	0.0	2	3.4
30	Rubber, miscellaneous plastics	1	5.3	3	5.2
32	Stone, clay and glass	0	0.0	1	1.7
33	Primary metals	1	5.3	3	5.2
34	Fabricated metals	10	52.6	21	36.2
35	Machinery except electric	4	21.1	9	15.5
36	Electric and electronic	0	0.0	7	12.1
37	Transportation equipment	0	0.0	0	0.0
38	Instruments and related products	0	0.0	1	1.7
39	Miscellaneous manufacturing	0	0.0	0	0.0
Total		19	100.0	58	100.0

Source: Special cross-tabulation made by the CNVRPA based on data supplied by Post College Survey of Employment in the Waterbury Labor Market Area, November 1978.

productive workers than similar industries in other areas may very well be producing basic goods even though it is less concentrated (in terms of employment) in the WLMA than it is in the nation. Similarly, an area which is a heavier consumer of certain goods may be producing non-basic goods even though it is more concentrated (in terms of employment) in the WLMA than it is in the nation. For this reason location quotients can only be used to provide a general estimate of the export oriented manufacturing activities of a region. Table 3 indicates that 22 of the top 40 industries in the WLMA (in terms of employment) have location quotients of 1.0 or more. Indeed, the dominant industries (the top ten industries in terms of employment) are all producers of basic goods.

5. Net income growth rates

A third indicator of industrial growth potential is net income growth rates.* Post College identified 58 industries in the WLMA with 5 or more employees that had the highest net income growth rate (over 20%) during the period 1973 to 1978. These 58 firms were concentrated in six major two digit standard industrial classification categories including fabricated metals (21 firms), machinery [except electrical] (9 firms), electric and electronic equipment (7 firms), printing and publishing (4 firms), rubber and plastic products (3 firms), and primary metals (3 firms). In total, these six major industry groups accounted for 47 out of 58 or 81.1% of all the fastest growing industries in the Waterbury Labor Market Area (see Table 4).

Despite the apparent faster growth of these six major industry groups, many of these same industry groups also had firms that experienced a decline in net income during the same period. Table 5 indicates that while fabricated metals and machinery [except electrical] accounted for nearly 52% of all the fast growth firms, these two industries also accounted for nearly 74% of all the firms with a

*The net income growth rates were estimated by surveying respondents and do not reflect audited financial statements of the firm.

decline in net income in the WLMA. These divergent growth patterns within the same industry categories, to some extent, may reflect the sharp competition found among those producing similar products.** Indeed, these two industry groups (SIC Codes 34 and 35) are heavily concentrated in the WLMA, accounting for almost 60% of the manufacturing firms with 5 or more employees surveyed by Post College in 1978.

A closer look at the fabricated metal industry reveals that screw machine products and metal forgings and stampings are the two dominant groups within the fabricated metals industry. However, even at this level there are no clear trends within any of the fabricated metal sub-industries. Firms producing metal forgings and stampings account for over half of the fast growth firms in the fabricated metal industry but this sub-industry also accounted for 35% of the fabricated metal firms experiencing a net decline in income (see Table 5).

In contrast to the divergent net income growth trends found within the fabricated metal industry, none of the 18 firms producing electric or electronic equipment in the WLMA indicated a decline in net income and more significantly 7 or nearly 39% had a net income growth rate of over 20% over the period 1973 to 1978.

Similar but less dramatic trends were found for a smaller number of firms producing paper and allied products, furniture and furniture fixtures, plastic materials, and primary metals.

6. Factors affecting employment and income growth

While most regional employment and income growth is a function of national economic trends, certain local factors may reinforce or deter the optimum growth of industry.

**Another factor which should be considered in evaluating industry responses to net income growth rates is their accounting systems. Company net income growth rates may sometimes be deceptive if some firms choose to minimize the importance of showing net income.

In theory, most industries attempt to optimize their location with respect to the availability of low cost labor, transportation, energy, and raw materials and to the greatest sales market for their products. However, in practice many industries continue to stay in an area even when there are no longer any competitive advantages for doing so. In effect, rather than optimizing their competitive advantages in the market place these industries may try to minimize the uncertainties of doing business at their current location. This pattern of thinking in part explains why the primary metals industry continues to be heavily concentrated in Waterbury even though the industry as a whole has been shifting to the southwest and north central part of the United States.

In order to determine the factors affecting industrial employment and net income growth, the CNVRPA staff analyzed the impact of two variables:* (1) the percent of materials purchased by industry groups within Connecticut, and (2) the percent of a firm's work related to defense contracts. While the percent of a firm's work related to defense contracts does not directly provide an index of the locational advantages of the Region, it does indicate the competitive advantages of local industry in securing government contracts.

It is generally assumed in classic location theory that industries will be able to lower their operating and transport costs by locating closer to their source of raw materials. If we assume that materials and supplies purchased within Connecticut are cheaper than those purchased from longer distances, then industries which heavily rely on Connecticut materials should have a competitive advantage over those relying on out-of-state sources. Table 6 indicates that of the 58 firms

*In addition, the CNVRPA evaluated the relationship of net income growth rates to the change in employment levels for all industry between 1970 and 1978. Significantly, there was a strong relationship (statistically significant at the .006 confidence interval level) between net income growth rates over the period 1973 to 1978 and increases in employment over the period 1970 to 1978. This indicates the obvious: that industries in the Waterbury Labor Market Area tend to grow in employment as they grow in net income and decline in employment as they experience a decline in net income growth.

Table 5: Comparison of Net Income Growth Rates Among Fabricated Metal Producers in the Waterbury Labor Market Area: 1973-1978

SIC Code	Industry	Net Income Growth Rate					Total	Percent
		Decline	Close to 0%	5-10%	10-20%	over 20%		
342	Cutlery, handtools, hardware	0	1	3	0	1	5	3.5
343	Plumbing, heating, except electrical	1	1	3	0	0	5	3.5
344	Fabricated structural metal products	2	8	4	0	1	15	10.6
345	Screw machine products	3	13	22	8	3	49	34.7
346	Metal forgings and stampings	3	13	16	4	11	47	33.3
347	Metal services NEC*	1	2	7	2	3	15	10.6
348	Ordnance and accessories NEC*	0	1	0	0	1	2	1.4
349	Miscellaneous fabricated metal products	0	1	0	1	1	3	2.1
Total		10	40	55	15	21	141	100.0

*NEC = Not elsewhere classified.

Source: Special cross-tabulation made by CNVRPA based on data supplied by Post College Survey of Employment in the Waterbury Labor Market Area, November 1978.

Table 6: Relationship Between Growth Rate and Local Purchase of Raw Materials for Manufacturing Firms having a Decline in Net Income and for those with a Net Income Growth of over 20% in the Waterbury Labor Market Area

Percent of Raw Materials Purchased from within Connecticut	Number of Firms with a Decline in Net Income	Percent	Number of Firms with Net Income Growth of Over 20%	Percent
0 to 19%	8	42.1	14	24.1
20 to 39%	1	5.3	5	8.6
40 to 59%	4	21.1	8	13.8
60 to 79%	2	10.5	7	12.1
80 to 100%	4	21.1	24	41.4
Total	19	100.0	58	100.0

Source: Special cross-tabulation made by CNVRPA based on data supplied by Post College Survey of Employment in the Waterbury Labor Market Area, November 1978.

Table 7A: Distribution of Defense Contracts by Net Income Growth Rates in the Waterbury Labor Market Area: 1978

Net Income Growth	Number of Firms	Average Percent of Firm's Business Related to Defense Contracts
Decline	19	1.9
Close to 0%	98	3.0
5 to 10%	109	3.6
10 to 20%	39	2.6
over 20%	58	6.3
Total	323	3.68

Source: Special cross-tabulation made by CNVRPA based on the data supplied by Post College Survey of Employment in the Waterbury Labor Market Area, November 1978.

with the fastest net income growth rate over the period 1973 to 1978, about half purchased 60% or more of their materials or supplies within Connecticut. In contrast, those firms experiencing a decline in net income had a much greater reliance upon out-of-state sources for their raw materials or supplies. Almost 70% of the firms with declining net incomes purchased less than 60% of their materials from within Connecticut.

This correlation was statistically significant at a .003 confidence interval. In effect, there is a 99.6% degree of confidence that there is a relationship between net income growth rates and percent of materials purchased within Connecticut. Moreover, this relationship continued to hold when controlling for the percent of a firm's work related to defense contracts. (In this case, the confidence level increased to 99.9%.) It is expected that with rising costs of energy, the cost of transportation will become an even more important factor in the location decisions of industry. Firms which are able to locate closer to their supplies will find themselves with a competitive advantage over other firms dependent upon distant sources for raw materials.

In 1978 the CNVRPA identified 34 industry groups (at the 3 digit SIC Code level) in the WLMA which purchased 50% or more of their supplies within Connecticut (see Table 7B). These industry groups appear to be largely attracted by the economies of scale associated with agglomeration within the primary metals and fabricated metals industries (inter-industry linkages) or by the economies of scale associated with large urban markets for products destined for the consumer (market linkages).

Similarly, defense contracts have had an impact upon the net income growth of certain industries in the Waterbury Labor Market Area. In 1978, the average manufacturing firm attributed 3.6% of its business to defense related activities. However, on the average, fast growth firms attributed 6.3% of their business to defense contracts while declining firms only attributed 1.9% to defense contracts (see Table 7A).

Table 7B: Industry Groups in the WLMA Heavily Relying on Materials Purchased within Connecticut: 1978

SIC Code	Industry Description	Percent of Materials Purchased from within Connecticut
327	Concrete, gypsum and plaster products	100.0
232	Men's and boys' furnishings	100.0
375	Motorcycles, bicycles, parts	85.0
349	Miscellaneous fabricated metal products	78.3
396	Costume jewelry and notions	78.0
271	Newspapers	76.6
357	Office and computing machines	75.0
265	Paperboard containers and boxes	75.0
345	Screw machine products, parts	71.4
259	Miscellaneous furniture and fixtures	70.0
381	Engineering and scientific instruments	67.5
208	Beverages	66.6
275	Commercial printing	65.7
342	Cutlery, handtools and hardware	54.4
335	Non-ferrous rolling and drawing	63.7
331	Blast furnace and basic steel products	62.5
355	Special industry machinery	62.0
359	Miscellaneous machinery [excluding electric]	60.7
272	Periodicals	60.0
307	Miscellaneous plastic products	56.5
384	Medical instruments and supplies	55.0
356	General industrial machinery	55.0
343	Plumbing, heating [except electric]	52.5
233	Women's and misses' outerwear	52.5
243	Millwork, plywood, structural members	51.6
225	Knitting mills	50.0
279	Printing trade services	50.0
281	Industrial inorganic chemicals	50.0
282	Plastic materials, synthetics	50.0
289	Miscellaneous chemical products	50.0
301	Tires and inner tubes	50.0
321	Flat glass	50.0
336	Non-ferrous foundries	50.0
399	Miscelleneous manufacturers NEC	50.0

Source: Special cross-tabulations of the Post College survey conducted by the CNVRPA, February 1979.

Not surprisingly, firms producing electric and electronic equipment have had the heaviest reliance on defense contracts. The average firm producing electric and electronic equipment attributed slightly over 20% of their business to defense contracts in 1978. (See Table 8.) As noted earlier, firms producing electric and electronic equipment also were the single fastest growing industry in the Waterbury Labor Market Area. Other industries in the WLMA with higher than average reliance on defense contracts (e.g., firms producing wooden containers indicated that 10.3% of their business was related to defense contracts and firms producing glass and clay products indicated that 5.0% of their business was related to defense contracts) have probably benefited as a result of subcontracts for work generated by electronic component firms. These findings appear to indicate that while defense contracts may not be as significant a component of the manufacturing activities of the Region's firms as they were during the Vietnam War, they still exert an important influence upon the rate of growth found within specific industries.

7. Spinoffs of growth

One of the principal considerations for towns wishing to attract growth industries to the Waterbury Labor Market Area is that fast growth industries will not only provide employment opportunities but will generate substantial tax revenue for a municipality. There is some evidence that fast growth firms are also the firms which are most likely to be expanding their plant size. The Post College survey found that the average firm with a net income growth rate of over 20% expected to expand its plant size by at least 5,000 square feet whereas declining firms on the average expected to increase their plant size by no more than 500 square feet. While these average industry figures for each rate of net income growth mask some important variations in industrial expansion plans, the variation can largely be explained by the difference in the size of the firm and the type of products produced by an industry. As an example, primary metal producers expected to increase their plant size by an average 7,720 square feet whereas the average firm in the Region expected to increase its plant size by 2,718 square feet.

Table 8: Manufacturing Firms with Business Related to Defense Contracts in the Waterbury Labor Market Area: 1978

SIC Code	Industry Description	Number of Firms	Percentage of Business Due to Defense Contracts
20	Food and kindred products	14	0.0
22	Textile mill products	2	2.0
23	Apparel and textiles	11	0.0
24	Lumber and wood products	3	10.3
25	Furniture and furniture fixtures	3	0.0
26	Paper and allied products	4	0.0
27	Printing and publishing	22	0.0
28	Chemicals and allied products	6	0.16
30	Rubber and miscellaneous plastics	14	2.35
32	Stone, clay and glass	6	5.0
33	Primary metals	8	1.25
34	Fabricated metals	142	3.6
35	Machinery except electric	51	2.9
36	Electrical and electronics	18	21.5
37	Transportation equipment	1	0.0
38	Instruments and related products	9	1.4
39	Miscellaneous manufacturing	9	1.3
Total		323	3.68

Source: Special analysis made by CNVRPA based on data supplied by Post College survey of employment in the Waterbury Labor Market Area, November 1978.

The fact that primary metal producers tend to be larger in size (measured by square feet of floor space and employees per firm) tends to make any increments to their plant more significant than a smaller firm which may be growing at a faster rate.

However, even when plant expansion plans are related to the size of existing firms, primary metal producers, textile mills and fabricated metal producers -- all having slower rates of net income growth in the Waterbury Labor Market Area -- had above average expansions in expected floor space compared to all other industries. This trend may very well reflect the fact that net income growth rates for these industries have been less than the average for the manufacturing sector as a whole because profits have been reinvested in new equipment and expanded facilities.

8. Profile of new growth

From a national perspective, manufacturing employment has been gradually decentralizing from urban centers to the suburbs and from the Northeast to the South and West. These trends have had especially serious consequences for the economic vitality of urban manufacturing centers in the Northeast such as Waterbury, Connecticut. Not surprisingly, Waterbury has lost employment opportunities both as a result of its competitive disadvantages with its suburbs and with other areas of the country where manufacturers can locate closer to the source of their raw materials.

While these inter-regional and intra-regional shifts in manufacturing employment have not been to the benefit of most large urban centers in the Northeast, it appears that some of the smaller urban centers near the metropolitan areas of New York, Boston, and Philadelphia have benefited from the suburbanization of manufacturing firms. As an example, this trend in large part explains why Connecticut's Gold Coast which borders metropolitan New York has attracted so many New York manufacturing firms. If this trend continues, the suburbanization

of metropolitan New York's manufacturing activities will have a positive impact upon the Waterbury Labor Market Area. The move of the Sales and Marketing Group of Timex from Greenwich to Middlebury in the Spring of 1979 may be a harbinger of things to come.

Employment growth in the Waterbury Labor Market Area is generally almost entirely attributable to the expansion of existing firms. However, during periods of declining manufacturing employment the location or establishment of new firms in the Region can be a significant component of total growth. As an example, between September 1977 and September 1978 the Waterbury Labor Market Area lost 520 jobs in the manufacturing sector. This loss would have been somewhat higher if there had not been an increase of 185 new jobs created by newly established plants, branch plants or plants relocating into the Region during the same period.[4] While newly established firms, branch plants or firms relocating into the Region are initially a small component of overall employment growth, they can be important in the long term expansion and diversification of the manufacturing sector. Between January 1, 1973 and September 30, 1978, 148 newly established firms, branch plants and firms moving into the Central Naugatuck Valley Region added an estimated 923 new jobs. These new firms are generally small in size with about 60% having less than 5 employees. Furthermore, about 60% of all firms that entered the Region in the last five years chose to locate either in Cheshire, Waterbury or Watertown.

These new firms provide a valuable perspective on the perceived locational advantages of the Central Naugatuck Valley Region for different types of industries. Table 9 indicates that five major industry categories (at the two digit SIC Code level) accounted for nearly 3 out of every 4 new firms entering the Region during the last five years. By far, the largest two industry categories were manufacturers of fabricated metals (39.6%) and machinery [not including electrical] (12.4%) which together accounted for about 52% of all new firms. The next most frequest industry categories were manufacturers of rubber and miscellaneous plastic products (9.1%),

Table 9: Types of Products Produced by New Manufacturing Firms Locating in the Central Naugatuck Valley Region, by Standard Industrial Classification Code: January 1, 1973 to September 30, 1978.

SIC Code	Industry Description	Total Number of Firms	Percent
34	Fabricated metals	48	39.6
35	Machinery except electric	15	12.4
30	Rubber and miscellaneous plastics	11	9.1
38	Instruments and related products	8	6.6
27	Printing and publishing	8	6.6
36	Electrical and electronics	5	4.1
33	Primary metals	5	4.1
23	Apparel and textiles	5	4.1
24	Lumber and wood products	4	3.3
25	Furniture and furniture fixtures	4	3.3
28	Chemicals and allied products	3	2.4
37	Transportation equipment	2	1.6
22	Textile mill products	2	1.6
20	Food and kindred products	1	0.8
32	Stone, clay and glass	1	0.8
Total		121	100.0

Source: CNVRPA Staff work based on the Connecticut Labor Department, Quarterly Bulletins, New Manufacturing Firms as of Record, January 1, 1973 to September 30, 1978.

instruments and related devices (6.6%), printing and publishing firms (6.6%), electric and electronic equipment (4.1%), primary metals (4.1%) and apparel and textiles (4.1%).

An analysis of the detailed industry categories most frequently choosing to locate in the Region reveals that nearly one out of every three new firms (at the three digit SIC Code level) were either producers of screw machine products (20.6%) or metalworking machinery (11.6%).

Significantly, all of the new producers of screw machine products have arisen from newly established firms and about 70% of all the new producers of metalworking machinery emerged from newly established firms. These two industries are already concentrated in the Region representing about 25% of the 575 manufacturers surveyed by Post College in 1978. In effect, the bulk of the new firms are tending to reinforce the Region's over-specialization of manufacturing production in two industry categories.

These findings tend to substantiate the view that newly established firms are attracted to the economies of scale associated with agglomeration in the fabricated metal and machinery industries. Agglomeration allows small manufacturers to take advantage of the plentiful supply of services, materials and labor skills that have already been developed as a result of the activities of existing manufacturers. Furthermore, by locating in an area where ancillary services, labor and materials are generally available, small manufacturers are able to lower their costs of doing business and avoid many of the uncertainties associated with establishing a new firm.

9. Profile of departing firms

A complete profile of new growth should also include a profile of the closings of firms that have entered the Region. Unfortunately, although this information

would be an extremely valuable indicator of the success rate of major industries locating in the Region, there is no reliable or complete list of firms which have left the Waterbury Labor Market Area or even the State of Connecticut. The best available information is that compiled by the Connecticut Department of Labor which indicates how many manufacturing firms in the Central Naugatuck Valley Region have relocated to other areas outside of the Region but stayed within the State of Connecticut.[5] This data may very well be a very poor indication of the success rate of industry groups in the WLMA since it does not include firms that moved to out of state locations or, more importantly, firms that moved into the Region but later ceased operations. Nonetheless, despite the lack of a complete profile, some limited insight can be obtained from data supplied by the Connecticut Department of Labor. The Connecticut Department of Labor data indicates that for the period January 1, 1973 to September 30, 1978 manufacturers of screw machine products (SIC Code 345) and metalworking machinery (SIC Code 354) accounted for slightly over one out of every two firms leaving the Region and relocating elsewhere in the state. The remaining industries which moved out of the Region included manufacturers of primary metals, miscellaneous fabricated metal products, miscellaneous plastic products, newspapers, and measuring and controlling devices.

10. Origin of new firms

An analysis of all new manufacturing firms locating in the State of Connecticut between January 1, 1973 and September 30, 1978 reveals that the overwhelming majority are newly established firms. The next most frequent type of new firms were those that decided to relocate from one town in Connecticut to another town within the state. Combined, these two types of firms accounted for 96% of all new Connecticut manufacturing firms on record during the last five years. (See Table 10.)

TABLE 10: Types of New Manufacturing Firms Locating in Connecticut and the Central Naugatuck Valley Region by Type of Firm: January 1, 1973 to September 30, 1978

	Connecticut		Region	
	Number	Percent	Number	Percent
Newly established firms	1,633	73.5	107	72.2
Branches of Connecticut firms	15	0.7	1	0.6
Branches of out-of-state firms	40	1.8	0	0.0
Complete transfers into Connecticut	29	1.3	1	0.6
Relocation from within the Region	0	0.0	22	14.8
Relocation from within Connecticut	203	22.6	14	11.4
TOTAL	2,220	100.0	148	100.0

Source: Connecticut Labor Department, Quarterly Bulletins, New Manufacturing Firms as of Record, January 1, 1973 to September 30, 1978.

Table 11: Origin of Out-of-State Firms Establishing Branches or Completely Transferring into Connecticut: January 1, 1973 to September 30, 1978

	Number	Percent
New York	40	57.9
New York Metropolitan Area	35	50.7
New Jersey	6	8.7
Massachusetts	7	10.1
Rhode Island	1	1.4
Ohio	2	2.9
California	2	2.9
Pennsylvania	3	4.3
Illinois	3	4.3
Canada	1	1.4
Missouri	1	1.4
Oklahoma	1	1.4
New Hampshire	2	2.9
TOTAL	69	100.0

Source: Connecticut Labor Department, Quarterly Bulletins, New Manufacturing Firms as of Record, January 1, 1973 to September 30, 1978.

A similar trend was also found for new manufacturing firms locating in the Central Naugatuck Valley Region with 98% of all new firms emerging from newly established firms or firms relocating from one municipality within the Region to another or from one municipality outside of the Region to a municipality within the Region. Only 3% of all new firms locating in Connecticut and 0.6% of all new firms locating in the Region originated from another state. These out-of-state firms typically made short moves from the larger metropolitan areas of New York or nearby urban centers in Massachusetts. Approximately 57% of all new firms originating from out-of-state and locating in Connecticut came from the metropolitan New York area and 84% came from the Northeast United States[6] (which includes the six New England states and New York, New Jersey and Pennsylvania). (See Table 11.)

11. Manufacturing activities of new firms

Based on trends for the last five years it appears that the types of firms which have most commonly chosen to move into Connecticut are ones which are either concerned with proximity to sales markets or materials or which have probably emphasized non-pecuniary considerations[7] in their decision to locate in the state. The most frequent type of firm moving into Connecticut during the last five years has been the corporate headquarters or executive headquarters. Together this type of firm accounted for almost 30% of the 69 new firms originating from out-of-state. (See Table 12.) Furthermore, manufacturers of plastic products, fabricated metals, precision instruments, electronic components, tape and stereo equipment and book publishers accounted for another 33% of all new firms originating from out-of-state. The bulk of these out-of-state firms have located along Connecticut's Gold Coast and the Greater Hartford Area. Only one out of the 69 firms from out-of-state relocating in Connecticut chose a location in the Central Naugatuck Valley Region. This finding supports the assumptions of the uncertainty theory of location choice and underscores the marginal role that can be played by economic development programs geared toward attracting firms from distant locations outside the state.

Furthermore, interstate competition for growth industries has been criticized by some economists as of marginal utility to the nation as a whole.

Specifically, it has been suggested that local efforts to attract industries from one region to locate in another region does not result in an overall economic improvement for the nation since it can lead to an inefficient use of public services or expensive operating costs for underutilized facilities in the Region where the industry was formerly located.[8] For this reason a regional economic growth strategy should emphasize the development of new industries or the attraction of more mature growth industries seeking branch plant locations in other areas in response to expanding sales markets. This approach to economic development avoids inter-regional competition and encourages efforts to be directed toward the stimulation of new growth industries or the attraction of growth occuring in more mature industries where growth entails expansion through branch plants.

Newly established firms are typically small in size and therefore cannot be expected to immediately offer large employment opportunities to individuals in the Waterbury Labor Market Area. Nonetheless, despite the marginal impact of small firms on employment opportunities or the tax base of a municipality during their early years, small firms may offer more realistic long-term opportunities of diversifying the Region's economy and developing products and services with strong prospects for growth. Growth experienced by more mature industries located in other regions of Connecticut or out-of-state may also benefit the Region when branch plants are contemplated. Significantly, branch plants accounted for about 58% of all new firms coming from out-of-state during the last 5 years.[9] About half of these branch plants came from the New York area and virtually all of them were from Northeast United States.

Table 12: Types of Services or Products Produced by Out-of-State Firms Establishing Branch Plants or Completely Transferring to Connecticut: January 1, 1973 to September 30, 1978

Type of Product or Service	Number of Firms
Corporate or executive headquarters	19
Plastic products	5
Publishing	4
Fabricated metal products	4
Electronic equipment	3
Precision instruments	3
Clothing and fabrics	3
Wire, cable	3
Tapes and stero equipment	3
Cosmetics/deodorizers	2
Machine shops	2
Miscellaneous	6
Total	69

Source: Connecticut Labor Department, Quarterly Bulletins, New Manufacturing Firms as of Record, January 1, 1973 to September 30, 1978.

FOOTNOTES

[1]U.S. Bureau of the Census, 1976 Annual Census of Manufactures.

[2]Data on manufacturing employment for the WLMA was supplied by the Employment Security Division of the Connecticut Department of Labor, October 1978.

[3]E.F. Schumacher, Small is Beautiful, Economics as if People Mattered. Harper & Row Publishers, New York, 1973. See Part III, Chapter 2, "Social and Economic Problems Calling for the Development of Intermediate Technology," pp. 171-190.

[4]Connecticut Labor Department, Quarterly Bulletins, New Manufacturing Firms as of Record, July 1, 1977 to September 30, 1978.

[5]In addition, Dun & Bradstreet maintains information on industry deaths but the Connecticut Department of Commerce staff felt this information was too general to be useful for a regional analysis of industry deaths.

[6]These findings are also supported by two recent studies. See the Academy for Contemporary Problems, Revitalizing the Northeastern Economy, 1978, p. 11 and the Joint Committee on Legislative Management, Office of Fiscal Analysis, Connecticut Business Tax Structure: A Comparative Analysis, September 1978.

[7]Gerald J. Karaska and David F. Bramhall, Editors, Locational Analysis for Manufacturing: A Selection of Readings, The MIT Press, Cambridge, Mass., 1969. See "Location Decisions of Manufacturers" by Eva Mueller and James

Morgan for an analysis of the subjective bases for location decisions (pp. 429-442). Mueller and Morgan found that 50% of all Michigan manufacturers surveyed in 1961 indicated that personal reasons and/or chance accounted for the main reason for locating their plant in Michigan. The emphasis on personal reasons was found to be greatest for small firms having only one plant or 2 to 4 plants since these location decisions are often strongly influenced by the personal location decisions of the chief executive. In addition, the survey found that when two locations are comparable in terms of maximizing profits and minimizing costs, executives will usually make the final decision based on non-pecuniary factors such as quality of life issues, amenities, and public services. This is particularly true for "footloose" industries which are minimally affected by the traditional location factors of proximity to materials, markets, labor costs and transportation.

[8]U.S. Department of Commerce, Regional Economic Development in the United States, October 1967, Part I and II. See Chapter 4 "Some Principles of Regional Economic Development" by Anthony Downs (pp. V-3 to V-7).

[9]Connecticut Labor Department, Quarterly Bulletins, New Manufacturing Firms as of Record, July 1, 1973 to September 30, 1978.

Consistency with Local, Regional and National Economic Development Policies

If the objective of the Central Naugatuck Valley Region is to maximize its economic growth in absolute terms, that objective cannot be consistent with the same objective pursued by every region in the United States simultaneously. If the growth at the United States level is a given, then if one region grows fast, another must grow more slowly. Largely because of these inter-regional forms of competition, Benjamin Chinitz has advocated that progress in productivity is the preferred goal of regional economic development.[1] As such, the main thrust of regional economic development should not be in terms of maximizing the comparative advantages of the Region with respect to other regions but the enhancement of its own regional productivity. According to Chinitz's theory, the enhancement of productivity may indirectly make a region more attractive but it ought not to be the region's primary objective. Under Chinitz's theory, more meaningful objectives for regional economic development are (1) maximization of per capita growth (not total growth), (2) acceleration of productivity, (3) increases in income levels and (4) increases in the standard of living.

Similarly, under the Public Works and Economic Development Act of 1965 the U.S. Economic Development Administration (EDA) has been required to adopt a policy that federal monies used for economic development planning may not be used to pirate industry from other areas of the country.[2] However, EDA does not discourage local efforts to identify the locational advantages of a region. In effect, local efforts which identify the locational advantages of a region for specific industries are within the scope of EDA policy as long as the local efforts merely identify the region's competitive advantages and do not attempt to recruit industry. Industrial development of a region can therefore be encouraged by attracting new manufacturing firms, expanding existing firms or by the establishment of branch plants which do not result in a loss of industry in other areas.

1. Regional policies

At a regional level, the Central Naugatuck Valley Regional Planning Agency (CNVRPA) has an adopted plan for the timing and location of industrial development. The plan identifies the municipalities of Waterbury, Wolcott, Watertown, Naugatuck and Cheshire as being the most suitable for immediate industrial growth over the short-term period 1978 to 1990.[3] The purpose of the timing of development policy is to encourage industry in areas where there is good access to major highways, existing supply of labor, proper utilities, suitable industrial land and public bus service. However, by encouraging industrial development to occur in these five municipalities, the CNVRPA is also implicitly encouraging the growth of industries which are compatible with local zoning regulations in these municipalities and which have locational advantages associated with urban settings. Firms which appear to fall into this latter category include (1) those relying on comparatively low wages and unskilled labor, (2) those requiring urban services (especially sewer and water service) for operation of their plant, (3) those desiring immediate access to major interstate highway systems and (4) those preferring urban locations for marketing their products.

By and large, the local zoning regulations of the five municipalities slated for immediate industrial growth offer few restrictions and few guidelines for selecting suitable industries except in so far as they all generally prohibit manufacturing activities associated with the production of the most offensive forms of pollution. Consequently, local zoning regulations by themselves are an insufficient guide to the economic development priorities of the municipalities within the Region.

2. Local economic development policies

Another important set of factors to consider in selecting suitable industries are the economic, social and environmental policies of the economic development commissions in municipalities slated for immediate industrial development.

Largely because of the "negative externalities" associated with some forms of industrial growth, this study has attempted to isolate industries which would be compatible with the environmental standards supported by local economic development commissions and planning and zoning commissions. In order to determine the general concerns of those directly involved in the Region's economic development matters, the CNVRPA staff interviewed the chairmen of economic development commissions and reviewed the zoning regulations of those municipalities which the CNVRPA has identified as suitable for immediate industrial development (Cheshire, Naugatuck, Watertown, Waterbury and Wolcott) and suitable for long-term industrial development (Beacon Falls, Middlebury, Oxford, Prospect and Thomaston).[4]

The chairmen of the economic development commissions in Cheshire, Waterbury, Watertown, and Naugatuck raised strong concerns about the social responsibility of industry and the possible dangers of industrial growth upon the quality of the environment. The majority of those interviewed cited a need for "clean industry" or "quiet industry" as important factors to be considered in selecting industries with growth potential. In addition, about half of those interviewed indicated that small firms with growth potential were preferred to large firms since they would place less of a strain on public services and facilities and would not generate massive new residential developments for workers who might be expected to reside in town.

While all of those interviewed conceived of economic development as a means of increasing the town's tax base, slightly over half of those interviewed specifically indicated that economic development in their town was a means of providing jobs and alleviating local unemployment. Not surprisingly, with the exception of Oxford, those specifically concerned with unemployment problems generally represented the economic development commissions in the urbanized portion of the Region (Naugatuck, Waterbury and Watertown).

Furthermore, two of those interviewed emphasized that small to moderate sized firms were preferred since they would create less of a demand for additional housing and consequently would place less of a burden on public services.

3. State environmental policies

Other environmental standards that have been reviewed in the selection of appropriate criteria for choosing suitable growth industries include air and water quality standards developed by the Connecticut Department of Environmental Protection (DEP). Several studies recently completed by DEP provide a broad means of comparing the potential environmental impact of major industry groups (at the two digit SIC code level) but did not offer standards which were sufficiently refined to evaluate specific industries associated with more detailed product categories (as defined at the four digit SIC Code level). Nonetheless, it is clear that the general thrust of existing and proposed state air and water quality standards is sharply geared toward the abatement of hazardous pollutants emitted by heavy industry. Based on the DEP study Industrial Site Constraint Manual, industries which appear to be given a low priority for the use of sewerage systems include the following:[5]

Table 12: Major Industries Least Compatible with Water Quality Concerns of the Region

Major Industry	SIC Code
1. ordnance	19
2. food	20
3. textiles	22
4. paper	26
5. chemicals	28
6. petroleum and coal products	29
7. stone, clay and glass	32
8. Primary metals	33

Unfortunately, these water quality guidelines as well as the air quality guidelines found in the proposed State Implementation Plan (SIP)[6] are too broad to be used to categorize the suitability of detailed industry groups (four digit SIC Code) within broad industry categories (two digit SIC Code). For this reason the air and water quality standards of DEP were not used as part of the methodology for selecting appropriate industry for the Waterbury Labor Market Area.

FOOTNOTES

[1]William N. Kinnard, Jr., Ed. The New England Region: Problem of a Mature Economy. Papers and proceedings of a conference held at the University of Connecticut, November 18, 1967. Published March 1968 by the Center for Real Estate and Urban Economic Studies, University of Connecticut. See Chapter I, "Problems of a Mature Economy," by Benjamin Chinitz, pp. 5-14.

[2]See Section 202(b)1 of the Public Works and Economic Development Act of 1965.

[3]Central Naugatuck Valley Regional Planning Agency, Land Use in the Central Naugatuck Valley Region: 1977, pp. 54.6 to 54.12.

[4]Ibid., p. 54.12.

[5]Department of Environmental Protection, Industrial Site Constraint Manual, Hartford, Connecticut.

[6]Department of Environmental Protection, State Implementation Plan, draft, January 1979.

CHAPTER IV

Methodology for Selecting Economic Growth Priorities

Introduction

The purpose of the previous analyses of location theory, growth trends, and economic development policies has been to clarify the methodology we have chosen for identifying growth industries. The methodology for determining priorities for economic growth in the Central Naugatuck Valley Region[1] represents a special effort to identify criteria which can provide direction for the planning and marketing activities of private industry, public and private agencies and individuals involved with economic development. The criteria used in determining the most appropriate direction for future development consist of general policies concerning the impact of growth on the economy, the tax base, the environment and the way of life in the Region. The policies reflect adopted regional objectives for economic development and informal policies of the Region's economic development commissions and chief elected officials. The criteria chosen to evaluate the growth potential of all major U.S. industries measure their potential for stimulating the growth of employment.

Methodology

A series of selection criteria was developed to isolate industries which would be the most likely to:

1. grow in employment
2. be easily attracted to the Region
3. be compatible with the environment
4. have locational advantages in terms of proximity to raw materials or sales markets in the Waterbury Labor Market Area[2]

The methodology encompassed four phases with special numerical thresholds established for accepting or rejecting an industry. After the four phases of the methodology were completed, industries that met all of the criteria were then ranked using the same criteria used in the selection phase with the addition of two national indicators for wages and employment productivity. An explanation of the criteria and assumptions associated with each phase of the methodology is presented below and in graphic form on page 52.

Phase 1: Employment Growth: 1967-1976

The analysis began by isolating those industries which have been growing at the most rapid rate in the United States over the period 1967 to 1976. It is believed that this measure of employment growth is a significant guide for estimating future growth. This study has focused upon detailed industry categories established by the Standard Industrial Classification Code (SIC)[3] in order to evaluate employment growth rates for specific product categories. These product categories are defined by the SIC Code through the use of a four digit classification system that isolates specific classes of industries. Using the detailed SIC Code, this study selected those industries which have had at least a 15% increase in employment over the period 1967 to 1976. In contrast, manufacturing employment in the nation declined by about 7.0% during the same period.

Phase 2: Location Quotient for the Northeast

The second phase of the analysis evaluated those growth industries which are concentrated in the Northeast (Connecticut, Rhode Island, Massachusetts, Vermont, Maine, New Hampshire, New York, New Jersey and Pennsylvania) since it is believed that these firms are the most likely to be attracted to Waterbury. This study, as well as other recent studies, has found that nearly 90%[4] of all out-of-state firms relocating in Connecticut originated from a nearby state in the Northeast. Limited knowledge concerning distant geographic areas has tended to encourage those making

relocation decisions to choose among locations close to home. Furthermore, this study has also found that industries which are concentrated in a region are also the most likely to consider relocation. For this reason concentration indices were developed to identify potentially mobile firms based upon an adaption of the location quotient formula.[5] In effect, those industries where the percentage of employment in the manufacturing sector of the Northeast was greater than the percentage of employment in the manufacturing sector of the United States were considered to be likely candidates for relocation in Connecticut.

Phase 3: Environmental Considerations

The third phase of the selection process involved evaluating the potential environmental impact of each of those industries that were concentrated in the Northeast. in terms of surrogate measures for air and water pollution and energy consumption. Industries which typically consumed more than 75 kilowatt-hours[6] per man-hour of production in 1972 were rejected as potentially unsuitable for states in the Northeast where energy costs are high and air pollution problems have long been a serious issue. Since the average American industrial firm consumed about 120 kilowatt-hours of energy per man-hour of production in 1971, a standard of 75 kilowatts was considered a reasonable guide for selecting industries with a below-average dependence upon energy in the production process. Coincidentally, those industries which were typically large energy consumers also tended to be a large water dischargers. Nearly all of the industries which consumed more than 75 kilowatt-hours of energy per man-hour also discharged more than 500,000 gallons of waste water per employee per year. Since the average American industry discharged about 743 gallons of waste water per employee in 1973, 500,000 gallons of waste water discharged per employee was considered a reasonable if not conservative standard for evaluating the waste water impact of industry groups.

Phase 4: Concentration of Activity - Material Supply Index

The final selection phase involved matching the environmentally compatible growth industries that had a concentration of industrial activity in the Northeast with an index which measured concentration of activity in the Region and material supply dependence in Connecticut developed from the 1978 Post College survey of industry in the Waterbury Labor Market Area (WLMA).[7] The index measured the concentration of each growth industry in the WLMA in terms of location quotients and estimated the percent of materials that might be purchased within Connecticut based on the average percent of materials purchased within Connecticut by similar three digit SIC Code industries surveyed by Post College. Those industries in which the proportion of employment in the manufacturing sector of the WLMA was less than half of the proportion of employment found in the same industry nationally and those industries which also purchased less than 50% of their materials or parts within Connecticut, were considered to have only a marginal chance of prospering in the Waterbury Labor Market Area. All of those industries that had a location quotient of less than .50 and less than 50.0% of their goods likely to be purchased within Connecticut were eliminated.

Ranking of Growth Industries

The 21 industries chosen as compatable with the WLMA were then ranked using the same indicators developed in the selection phase with the addition of two indicators measuring value added per employee and annual salary per employee. (See Table 13.)

The most significant factor used in the weighting process was the concentration of activity-material supply index (accounting for 50% of the total weight) which was a composite variable developed by the CNVRPA. This composite variable was derived by multiplying the location quotient for each growth industry times the percent of materials purchased within Connecticut. The index essentially measures the growth potential of industries which have strong linkages to Connecticut industry or to

Connecticut consumer markets. The concentration of activity component of the index measures the degree of agglomeration in the WLMA while the materials supply component evaluates the growth potential of these industries. Combined as a single quotient, the index emphasizes the relative growth potential of basic industries in the WLMA.

Industries which were more concentrated in the WLMA than in the Nation and which would be expected to purchase all of their materials within Connecticut had the highest score. The highest score, in effect, merely reflects the concentration of an industry in the WLMA since if 100% of a firm's materials are purchased in Connecticut than a multiplier of one makes the final number equivalent to the location quotient. At the other extreme, and industry which was well represented in the WLMA (in terms of employment) but had only 25% of its materials purchased within Connecticut would have a concentration of activity - materials supply index which would be one quarter of the value of the location quotient.

The assumption behind the index is that future economic development is most likely to occur in those growth industries which are concentrated or show signs of becoming concentrated in the WLMA and which heavily rely upon materials and parts produced in Connecticut. In this sense, the concentration of activity-materials supply index sharpens the traditional economic base analysis since it differentiates between basic industries with growth potential and basic industries which are gradually declining in importance due to overreliance upon distant sources for supplies.

The weightings used in the ranking process reflect policy considerations concerning the significance of each criteria as it affects the overall evaluation of economic growth. Low weightings do not necessarily indicate that a certain factor (e.g., environmental considerations) was given a lesser weight since as indicated earlier the study initially selected out industries which were considered clearly

incompatible. Consequently, the weighting process was merely a subsidiary component of the selection process developed to rank industries that had already been selected out as suitable for the WLMA.

The data used in the analyses is the most current information available from the U.S. Census of Manufactures and the Annual Survey of Manufactures. A detailed description of the criteria used to evaluate industries suitable for the WLMA is presented in the Appendix. The selection process, the criteria used and the weighting scheme are presented below.

Selection Methodology

Number of Industries Remaining After Selection Phase*	Phase	Selection Factors
84	1	Employment growth rate in U.S. of 15% or more: 1967-1976
44	2	Location quotient of 1.00 or more for industries in the Northeast: 1972
34	3	Less than 75 kilowatt-hours equivalency of energy consumed per employee per year in the U.S.: 1971 and less than 500,000 gallons of waste water discharged by industry per employee in the U.S.: 1973
21	4	Concentration of activity of at least .50 in the WLMA or at least 50% of materials supplied by sources within Connecticut.

Ranking Methodology

Weight	Weighting Factors
50.0	Concentration of activity - materials supply index in the WLMA: 1978
20.0	U.S. employment growth: 1967-1976
12.0	Location quotient for industries in the Northeast: 1972
7.5	Kilowatt-hours equivalency of energy consumed per man-hour in the United States: 1971
4.0	Value added per employee in the United States: 1976
4.0	Annual salary per employee in the United States: 1976
2.5	Total waste water discharge by industry per employee in the United States: 1973
100.0	

*The Selection Phase began with an evaluation of the 451 industry categories at the four digit level of Standard Industrial Classification under the 1972 revision of the SIC Code.

SELECTION METHODOLOGY FOR DETERMINING INDUSTRIES WITH ECONOMIC GROWTH POTENTIAL IN THE W.L.M.A.

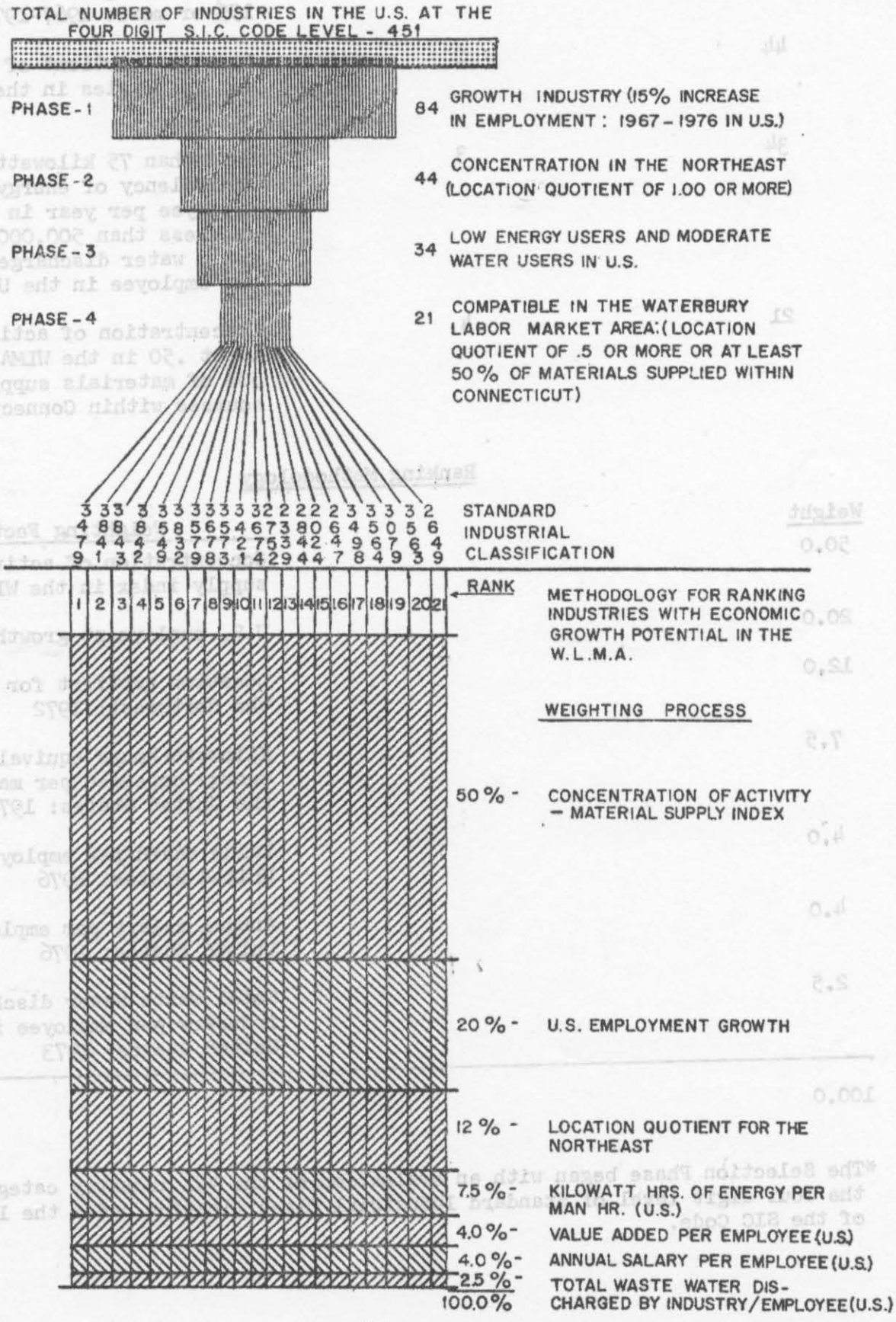

Table 13: Priority Ranking of Major Industries with Economic Growth Potential in the Waterbury Labor Market Area: 1979

Standard Industrial Classification	Industry	Rank
3479	Metal Coating and Allied Services	1
3841	Surgical and Medical Instruments	2
3843	Dental Equipment and Supplies	3
3842	Surgical Appliances and Supplies	4
3549	Metalworking Machinery NEC*	5
3832	Optical Instruments and Lenses	6
3579	Office Machines, Typewriters, etc.	7
3678	Electronic Connectors	8
3573	Electronic Computing Equipment	9
3421	Cutlery	10
3674	Semi-Conductors and Related Devices	11
2752	Commercial Printing, Lithographic	12
2339	Women's and Misses' Outerwear NEC*	13
2844	Toilet Preparations	14
2024	Ice Cream and Frozen Deserts	15
2647	Sanitary Paper Products	16
3498	Fabricated Pipe and Fittings	17
3564	Blowers and Fans	18
3079	Miscellaneous Plastic Products	19
3563	Air and Gas Compressors	20
2649	Converted Paper Products	21

*NEC = not elsewhere classified.

Source: CNVRPA Staff work, February 1979.

Appendix

1. Concentration of Activity-Materials Supply Index in the WLMA: 1978

The concentration of industrial employment by industry in the WLMA expressed as a proportion of industrial employment by industry in the United States was used as one indication of the growth potential of an industry in the Waterbury area. The second indication of growth potential was the percent of materials purchased within Connecticut. It was assumed that future economic development is most likely to occur in those growth industries which are both concentrated in the WLMA and which are heavily dependent upon the use of materials produced in Connecticut. The index implicitly reflects the combined significance of the locational advantages for purchase of raw materials locally and the potential for expanded sales markets in the Waterbury Labor Market Area.

2. U.S. Employment Growth: 1967-1976

The percent change in employment by industry between 1967 and 1976 was used as an indication of potential employment growth over the next 5 years. It was assumed that national employment trends by the four digit standard industrial classification reflect trends in the Northeast as well as the State of Connecticut. In effect, growth is considered as a national issue affecting each region differently, depending upon its mix of growth and declining firms.

3. Location Quotient for Industries in the Northeast: 1972

Industries which are heavily concentrated (in terms of employment) in the Northeast are expected to be the most likely to consider relocating or establishing branch plants in Connecticut. Location quotients for each industry were developed based on the 1972 Census of Manufactures for the nine states comprising the New England and Middle Atlantic division. It was assumed that concentration of activity reflects intra-industry competition and therefore the presence of potentially mobile industries. These unstable market forces are considered to be an indication of potential for branch plant or relocation activity.

4. Kilowatt-hour Equivalency of Energy Consumed per Man-Hour in the United States

Industries which heavily rely on energy in the production process were considered to have a market disadvantage in the Waterbury Labor Market Area. The high cost of energy in Connecticut along with serious air pollution problems in the Air Quality Control Region in which the Waterbury Labor Market Area is located, clearly indicate that industries with minimal dependence upon energy in the production process will face the least obstacles. The kilowatt-hour equivalency of energy consumed per man-hour of production was used as the key indicator for energy dependence and is a surrogate measure for high air pollution levels. Since industries which consume vast amounts of energy very often release energy in the form of air pollutants, an energy evaluation of industry implicitly provides an air quality assessment of the industry at the same time.

5. Value added per Employee in the United States: 1976

The higher the value added to a product the more likely that the value will result in increased income for employees and for the local economy. As such, value added per employee in 1976 is a surrogate measure of an industry's potential for stimulating employment and income growth in business activities dependent upon the manufacturing sector. For each additional 100 employees added to the manufacturing sector, a U.S. Chamber of Commerce study estimates that an additional $565,000 is generated in retail sales.[8] The multiplier effect associated with industrial growth is one of the principal reasons why this study has focused on regional economic development efforts for growth industries within the manufacturing sector of the economy.

6. Annual Salary per Employee in the United States: 1976

Industries which typically offer higher wages have been given a slightly higher importance in the final ranking of industries suitable for the Waterbury Labor Market Area. It was assumed that because income levels in Connecticut are higher than elsewhere, industries with high wages would be the least affected by the state's high wage rates. Furthermore, it was assumed that since all of the 21 industries that were chosen already were concentrated or show signs of becoming concentrated in the Waterbury Labor Market Area, industries offering higher wages would be able to utilize existing labor resources just as well as low wage industries.

7. Total Water Discharge by Industry per Employee per Year in the United States: 1973

The urban core of the Waterbury Labor Market Area is faced with long term constraints to development due in part to the limited capacity of the sewage treatment plants in Thomaston, Waterbury, Naugatuck, Cheshire, and Beacon Falls. In order to maximize the long term capacity of these sewage treatment plants it was assumed that industries which typically discharge excessive volumes of waste water would prematurely consume the remaining capacities of the Region's sewage treatment plants leading either to large capital expenditures for tertiary treatment or a halt to further residential or industrial development.

FOOTNOTES

[1]The Central Naugatuck Valley Region consists of the municipalities of Beacon Falls, Bethlehem, Cheshire, Middlebury, Naugatuck, Oxford, Prospect, Southbury, Thomaston, Waterbury, Watertown, Wolcott, and Woodbury.

[2]The Waterbury Labor Market Area consists of all the municipalities in the Central Naugatuck Valley Region except Oxford.

[3]The Standard Industrial Classification Code has been developed by the U.S. Office of Management and Budget as a means of classifying industries according to the products they manufacture. Using the SIC Code, comparisons can be made at a broad or a detailed product category. Two digit SIC Codes (e.g., 33 = primary metals) refer to major industry categories, 3 digit SIC Codes (e.g., 332 = iron and steel foundries) refer to major sub-industry groups and 4 digit SIC Codes (e.g., 3321 = gray iron foundries) refer to specific industries and associated products.

[4]See Academy for Contemporary Problems, Revitalizing the Northeastern Economy: A Survey for Action, General Summary and Recommendations, p. 11, 1978 and Joint Committee on Legislative Management, Office of Fiscal Analysis Connecticut Business Tax Structure: A Comparative Analysis, September 1978.

[5]The location quotient indicates the degree to which a given industrial group is of greater or lesser importance locally rather than nationally. The location quotient is calculated by dividing the percentage of local employment in each industry group by the percentage of national employment in the same industry group. Indices of 1.00 indicates that a particular industry has the same proportion of employment locally as it does nationally. Location quotients of less than 1.00 indicate that the local economy is

deficient in this particular industry group and therefore is probably importing a portion of its needs for the type of products associated with that industry.

[6]Kilowatt hours per man-hour includes the kilowatt hour equivalencies for non-electric forms of energy used within each industry.

[7]The Survey of Economic, Educational and Counseling Opportunities (SEECO) conducted by Waterbury's Post College in 1977 and 1978 included 4665 employers of which 1285 had 5 or more employees. The data used for developing the Concentration of Activity Materials Supply Index was derived from a special series of cross tabulations prepared by the CNVRPA staff in December 1978.

[8]Chamber of Commerce of the United States, What New Jobs Mean to A Community, Washington, D.C., 1978, p. 8.

CHAPTER V

Methodology for Selecting Emerging Growth Products

Those growth products which could be easily produced by local industry with little or no retooling would allow for the diversification of the manufacturing activities and labor skills found in the Region. Furthermore, industries which specialize in the production of emerging growth products and which could expect to obtain most of their raw materials and supplies within Connecticut should be considered a sublist of the industries with economic growth potential. However, most of the growth products are associated with industries which were eliminated during the selection phase, either due to a declining or less than optimal growth in employment, low concentration of activities in the Northeast or because of intensive use of energy. Nonetheless, one must bear in mind that each industry group at the 4 digit SIC Code level produces a variety of products, some of which may be growing and others which may be declining. For this reason, even industries with a decline in employment may be producing a growth product and may be concentrated in the Northeast and be minimal users of energy in the production process.

Past growth trends may be somewhat misleading for some industries which have recently created new products or new markets for old products which may very well have a strong potential for growth that is not reflected in the data compiled by the U.S. Census of Manufactures or the Annual Survey of Manufactures at the industry level. Federal government regulations, the energy crisis, changing consumer buying patterns among the baby boom generation and environmental constraints affecting the products made by the manufacturing sector will undoubtedly influence the rate of income and employment growth associated with industries making certain products. As an example, it is expected that industries producing home insulation, energy saving mechanical and electrical devices, solar heating systems, photovoltaic energy systems and vehicles powered by electricity may very well show unprecedented

rates of growth. Standard and Poors 1978 Industry Surveys indicates that solar heating equipment appears to be a worthwhile investment with the potential for dramatic rates of growth over the next decade.[1] The 1978 Industry Surveys and the 1978 U.S. Industrial Outlook[2] indicate that rising costs of energy are also having a favorable impact upon the rate of growth for bicycle manufacturers with especially good prospects for manufacturers of mopeds. Similarly producers of heat pumps, carpeting, electric heating systems and oil and gas drilling equipment and services are also expected to benefit from the Nation's energy problems over the next decade.

Standard and Poors 1978 Industry Surveys and the U.S. Department of Commerce 1978 U.S. Industrial Outlook both indicate that those producing medical and dental equipment and supplies should continue to grow at a rapid rate largely due to the growth of the Nation's elderly population. In particular, the 1978 Industry Surveys singles out the dental supply industry as the fastest growing component of the Nation's health care industry with projected annual income gains of over 10 percent until 1985. Also expected to benefit from the advancing age of the baby boom generation are those producing cosmetics and toiletries with especially strong growth predicted for fragrances and hair and skin care products.

Another national trend - automation of traditionally labor intensive services and products - may very well have as great an impact upon industrial growth as the energy crisis. As the Nation's service sector grows in size, products which promise to reduce inefficient labor practices in public or private bureaucracies or minimize paper work (and paper shortages) will become very attractive. Of particular interest in this field are computers, duplicating machines, calculators, optical scanners and lasers.

Increases in automation, reduction in the work week, early retirement trends and less than satisfying or meaningful work activities are expected to have a positive impact upon industries producing products for leisure activity. Recently, sharp

growth has been seen for those producing tents, sleeping bags, boats, cameras, and for camping equipment. This trend should continue according to Standard and Poors as the population becomes older and has more disposable income.

Government regulations are expected to stimulate an above average rate of growth among manufacturers of residential, municipal and industrial waste water equipment, air pollution control equipment and solid waste recycling systems. These products are expected to grow at a rate of 11 to 23% a year through 1985 according to the 1978 Industry Surveys. Although it is still too early to determine the full impact of forthcoming federal regulations it is expected that industries producing modular housing and energy efficient public transit systems (buses and railroad equipment), and their subsidiary industries may very well benefit from expected federal incentives for low cost housing and mass transit systems.[3]

The emerging growth products identified by Standard and Poors and the 1978 U.S. Industrial Outlook is intended to supplement the list of industries that have been identified as having growth potential in the Waterbury Labor Market Area. While emerging growth products cannot be ranked using past industry trends, they can be broadly evaluated in terms of their potential compatibility with the manufacturing activities of the WLMA and the local availability of raw materials used in making these products.

As can be seen, three of the growth products listed in Table 14 are associated with three of the growth industries suitable for the WLMA including industries manufacturing (1) semi-conductors and related devices, (2) blowers and fans, and (3) optical instruments and lenses. Another three growth products are produced by industries not concentrated in the Northeast (bus bodies, heat exchangers, and gas well and oil field machinery and equipment), five products are associated with industries that had net employment loses over the period 1967-1976 (solar heating devices, electric automobiles, laser scientific and engineering devices, optical measuring

Table 14: Evaluation of Industry Groups Producing Growth Products Based on the Selection Criteria for Choosing Growth Industries

Industry Code Associated with Product	
	Growth Products Compatible with Waterbury Industry
3674	Photovoltaic devices
3564	Air pollution and dust collection equipment
3832	Optical measuring instruments
	Products Eliminated in Phase 3 (environmental considerations)
3296	Fiberglass insulation
	Products Eliminated in Phase 2 (not concentrated in Northeast)
3443	Heat exchangers
3533	Gas well and oil machinery and equipment
3713	Bus bodies
	Products Eliminated in Phase 1 (low employment growth)
3629	Electromechanical generators (fuel cells)
3634	Electric heating equipment
3589	Sewage purification equipment
3751	Bicycles and mopeds
3822	Electric air cleaner controls
	Products Eliminated in Phase 1 (employment loss)
2452	Prefabricated wood buildings
3711	Electric automobiles
3811	Laser scientific and engineering equipment
3662	Laser systems and equipment except scientific and engineering instruments
3545	Optical measuring devices

Source: CNVRPA staffwork based on data derived from Standard and Poors 1978 Industry Surveys and the 1972 Standard Industrial Classification Manual.

devices and laser systems equipment [excluding scientific and engineering instruments] and prefabricated wood buildings) and one product was associated with an industry which is an intensive energy user (fiberglass insulation). The remaining 5 products are produced by industries which had employment growth rates of from 2 to 14.9% during the period of 1967 to 1976 and consequently were not selected during the first phase of the industrial growth analysis. These five products include electric heating equipment, electromechanical generators, sewage purification equipment, bicycles, and electric air cleaner controls.

Projected growth industries

Further support for the methodology chosen in this study is seen in the consistency between the projected growth industries identified by the Connecticut Department of Commerce and the projected growth industries identified in Table 13. The Connecticut Department of Commerce has recently identified 11 industries which have growth potential in the State of Connecticut.[4] These eleven industries are listed in Table 15 and include three industries which this study has already identified as having growth potential in the Waterbury Labor Market Area. These three industries are toilet goods (SIC Code 284), medical instruments and supplies (SIC Code 384), and handtools, hardware and cutlery (SIC Code 342). However, manufacturers of household appliances (SIC Code 363) and mechanical measuring and controlling devices (SIC Code 328) were identified as growth industries by the Department of Commerce but were not selected using the methodology developed in this study due to the fact that neither industry is concentrated in the WLMA nor is expected to have a locally available supply of raw materials.

Another perspective on growth industries is provided by a recent study prepared by the Connecticut Labor Department. The Connecticut Labor Department has projected employment growth for broad industry categories in the Waterbury Labor Market Area. Using a base year of 1974, the Connecticut Department of Labor study provides

Table 15: Industries with Growth Potential in the State of Connecticut

SIC Code	Industry
205	Bakery products
208	Beverages
284	Toilet goods
342	Handtools, hardware, cutlery
343	Plumbing and heating, etc. electrical
359	Miscellaneous machinery, excluding electrical
363	Household appliances
366	Communication equipment
381	Engineering and scientific instruments
382	Mechanical measuring, controlling devices
384	Medical instruments and supplies

Source: Connecticut Department of Commerce, Draft Economic Development Plan for Connecticut, Unpublished draft, October 1978.

employment projections for 1979, 1980 and 1985. The Study indicates that manufacturing employment should remain fairly stable between 1978 and 1980 and may show a slight increase by 1985.[5]

While manufacturing employment in the Waterbury Labor Market Area is expected to increase by 2.93% between 1979 and 1985, an above average rate of employment growth was predicted for manufacturers of machinery (9.73%), fabricated metal (5.36%), primary metals (4.90%), electrical equipment (4.09%), and printing and publishing (18.18%). To some extent the expected above average employment growth for manufacturers of machinery, primary metals, fabricated metals and printing and publishing reflects an anticipated recovery from their downward spiral experienced in the seventies.

However, unlike the cyclical swings in employment experienced by the above industries, manufacturers of electrical equipment in the WLMA are expected to continue their long term growth pattern at an above average rate, according to the Connecticut Labor Department projections.

FOOTNOTES

[1]Standard and Poors, 1978 Industry Surveys.

[2]U.S. Department of Commerce, 1978 U.S. Industrial Outlook, January 1978.

[3]Recent amendments to the Urban Mass Transportation Act of 1964 and the National Energy Act are providing incentives for bus manufacturers and for manufacturers of energy efficient buildings and building products.

[4]Connecticut Department of Commerce, Draft Economic Development Plan for Connecticut, unpublished draft, October 1978.

[5]Connecticut Labor Department, Employment Security Division, Annual Planning Report for Fiscal Year 1979 Waterbury, Connecticut, May 1978, pp. 10-11.

Criteria for Selecting Growth Industries: Secondary Impacts

A final consideration in selecting economic growth priorities is the secondary impact of a new industry. Clearly, the establishment of a new firm directly increases the employment and income levels in the Region; however, it is not always as clear that new industry can have a secondary influence upon the economic growth of existing manufacturing and commercial enterprises. This secondary impact can take many forms depending upon the type of industry that is introduced into the economy. Eight important secondary impacts of new growth have been identified as possible additional criteria for evaluating the suitability of the 21 different industries that could be attracted to the Waterbury Labor Market Area. These eight secondary impacts are as follows:

1. achieving import substitution
2. establishing economic linkages with related local industry
3. developing concentrations of activity to achieve local threshold effects
4. creating internal specialization among industries concentrated in the Region
5. maximizing the export-related production activities of local industry
6. stimulating product innovations and new product applications
7. diversification of manufacturing activities to create employment stability
8. minimization of structural unemployment problems in the Region.

Table 16 indicates the probable secondary impacts of each of the 21 industry groups. A detailed discussion of each of the secondary impacts is presented below.

Economic Growth Potential in the Waterbury Labor Market Area: 1979

Standard Industrial Classification (SIC)	Greatest[1] Potential for Import Substitution	Greatest[2] Potential for Backward Linkage with Industries Concentrated in the WLMA	Greatest[3] Potential for Threshold Effect	Greatest[4] Potential for Encouraging Subdivision of Industrial Activities	Greatest[5] Potential for Multiplier Effect	Greatest[6] Potential for Product Innovation for Energy Efficiency	Greatest[7] Potential for Diversification and Employment Stability	Greatest[8] Potential for Minimizing Structural Unemployment	Total Probable Secondary Impacts
3479 Metal coating and allied services		●	●	●				●	4
3841 Surgical and medical instruments		●			●	●	●		4
3843 Dental equipment and supplies		●			●	●	●		4
3842 Surgical applicances and supplies		●			●	●	●		4
3832 Optical instruments and lenses				●	●	●		●	4
3549 Metalworking machinery NEC		●		●				●	3
3579 Office machines, typewriters, etc.		●	●		●	●			4
3678 Electronic connectors		●		●	●		●		4
3573 Electronic computing equipment		●	●		●	●	●		5
3674 Semi-conductors and related devices		●			●				2
2752 Commercial printing, lithographic	●								1
3421 Cutlery	●								1
2339 Women's and misses' outerwear NEC			●				●		2
2844 Toilet preparations	●		●				●		3
2024 Ice Cream frozen desserts	●						●		2
2647 Sanitary paper products	●						●		2
3498 Fabricated pipe and fittings		●		●				●	3
3564 Blowers and fans		●		●	●	●		●	5
3563 Air and gas compressors		●		●	●	●		●	5
3079 Miscellaneous plastic products			●		●	●		●	4
2649 Converted paper products						●	●		2

Footnotes to Table 16.

1. Import substitution reflects the extent to which manufacturing firms produce goods which are directly purchased by local consumers.

2. Potential for backward linkage with industries concentrated in the WLMA measures the general inter-industry linkages of growth firms with the six industries that have the greatest level of employment in the WLMA.

3. The greatest potential for threshold effect is based upon an identification of those industries which have less than half but not more than the same concentration of industrial activity in the WLMA as in the nation as a whole.

4. Subdivision of industrial activities assumes a potential of growth industries to further specialize similar two digit SIC Code industries which are concentrated in the WLMA.

5. The greatest potential for a multiplier effect includes all those growth industries which are expected to export at least 10% of their value of shipments outside of Connecticut based on the experience of the same industries located in Connecticut.

6. Greatest potential for product innovation for energy efficiency is a subjective indicator of industries most likely to develop new products utilizing energy more efficiently.

7. A diversification strategy emphasizes attracting those industries which are not concentrated in the WLMA and/or that have the greatest insulation from national business cycles.

8. Industries offering the greatest potential for minimizing structural unemployment include all growth industries categorized in the same two digit SIC Code as industries concentrated in the WLMA.

Source: CNVRPA Staff work, January 1979.

1. Import substitution

As an area expands in population, further economic growth can occur when products which were formerly imported are now capable of being produced and consumed locally. Firms that can be attracted through an import substitution strategy are generally highly dependent upon proximity to sales markets. Included in this category are food processing and beverage industries and printing and publishing firms.[1] The secondary benefit of attracting firms which produce these products is that less of the Region's money is exported to other areas of the Nation, which according to economic base theory improves the balance of payments for the Region.

2. Backward linkage*

Another means of stimulating secondary growth is by attracting industries which are linked with the products of industries in the Waterbury Labor Market Area. This form of growth capitalizes on proximity to raw materials or supplies in order to reduce operating costs.[2] This inter-industry linkage benefits both the industry supplying the raw material and the industry purchasing the raw material for use in its finished product. Secondary industrial growth of this kind can be stimulated simply by identifying industries with linkages to industries concentrated in the WLMA.

In 1978, the six major industry groups (in terms of employment) in the WLMA were manufacturers of (1) watches, clocks, and watchcases, (2) screw machine products, (3) costume jewerly and notions, (4) metal forgings and stampings, (5) electronic components and accessories and (6) metal working machinery. Attracting industries which rely on the finished products of these six industry groups would optimize the secondary benefits offered to the local economy derived from a backward linkage strategy.

*A firm that produces an output that is used by a second industry as part of its input, is said to have a "forward linkage" with the second industry. In turn, the second industry is said to have a "backward linkage" with the first industry.

3. Threshold effect

In smaller urban areas economic growth may hinge upon the size of the city and the concentration and mix of industrial activities. Industries which are typically attracted to larger cities are usually most dependent upon the external economies of scale made available by a concentration of services, labor supply, sales markets or raw materials from linked industries. This threshold effect postulates that before certain industries will locate in an area, there must be a sufficient concentration of activity and services so that industries unable to provide their own services can make use of services provided in the open market.[3] This, in part, explains why so many small manufacturers of fabricated metals have chosen to locate in the Waterbury area where metal supplies, materials and services are abundant.

4. Subdivision of industrial activities

As an industry becomes more concentrated in one area, additional growth may also be generated as individual firms develop a more intensive internal specialization of production processes. This tendency to internal specialization can lead to a "breaking out" of new specialties serving existing producers.[4] This natural process does increase the number of new firms in the Region and may reinforce the development of a regional growth center for specific forms of manufacturing activities. However, the strategy does not necessarily further long-term objectives of diversifying the Region's manufacturing activities since strong inter-industry linkages among industries which are declining in employment can make the economy more vulnerable to the vicissitudes of national business cycles.

5. Multiplier effect

One of the strongest ways of increasing the net income growth of the Region is by attracting industries with the greatest export potential. Industries which typically export most of their finished goods to other regions produce a net

flow of money into the Region. In contrast, when industries are unable to meet the needs of the local area, goods must be imported from other regions resulting in a net flow of money out of the Region. An economic development strategy that is able to increase its export-oriented activities (basic goods) will be able to stimulate a greater flow of money, which in turn stimulates the growth of businesses oriented to local markets (commonly referred to as producers of non-basic goods). This theory has been the principal reason why most economic planners emphasize strategies which stimulate growth in the manufacturing sector of the economy.[5]

Though all manufacturing activities have a multiplier effect on the activities in the retail and service sector, certain industries have proven to be more likely to stimulate secondary economic growth. One way of measuring the potential for a multiplier effect upon local business is by the level of export activity associated with an industry. Based on data developed by the 1972 U.S. Census of Manufactures for industries located in Connecticut, it is clear that five major industry groups are more oriented to export oriented activity;[6] These include manufacturers of transportation equipment (SIC Code 37), instruments and related products (SIC Code 38), machinery [except electric] (SIC Code 35), electric and electric equipment (SIC Code 36) and chemicals and allied products (SIC Code 28). As can be seen in Table 17, based on export activity as a percent of total value of shipments, all of the other major industries in Connecticut are producing more of their goods for local markets and therefore cannot be expected to have as significant an impact upon the net inflow of money into the Region as these five export-oriented firms.

6. Product innovations

Another important contribution to economic growth has often come through the development of new products, or new applications for old products. New England has long been considered a cradle for inventions, new products and new industries and the

Table 17: Exports as a Percent of Total Value of Shipments for Major Industries in Connecticut: 1976

SIC Code	Industry	Exports as a Percent of Total Value of Shipments
37	Transportation equipment	24.4
38	Instruments and related products	20.3
35	Machinery except electric	11.6
36	Electric, electric equipment	11.3
28	Chemicals and allied products	10.2
39	Miscellaneous manufacturing	6.1
34	Fabricated metals	5.6
26	Paper and allied products	4.0
23	Apparel and other textile products	2.6
27	Printing and publishing	2.4
22	Textile mill products	2.0
30	Rubber, miscellaneous plastic products	1.8
33	Primary metals	1.5
20	Food and kindred products	1.2
31	Leather, leather products	1.1
32	Stone, clay, glass products	1.1

Source: U.S. Bureau of the Census, 1972 Census of Manufactures, Connecticut.

Waterbury Labor Market Area has provided a significant number of new products and ideas in its own right.

Continued growth through product innovations has been fostered through state and federal grants for research and development projects. In particular, it appears that growing concerns with rising energy costs and limited supplies of crude oil in the world may very well be instrumental in the growth of a wide variety of energy related products and industries.[7] With "necessity being the mother of invention" it appears to be only a matter of years before major changes are made in consumer buying patterns, substituting products that are inefficient and expensive users of energy for products which are more efficient and less expensive users of energy. Certainly, firms which produce energy efficient products are bound to be competitive in the Northeast where energy costs are higher and where these is a strong reliance on imported fuel oils. More importantly, the attraction of industries which manufacture new energy related products will stimulate the growth of local manufacturing activities providing the basic materials for the growth products.

7. Diversification strategies aimed at promoting employment stability

Little public or private effort is needed to attract industries like those in which the Region is already overspecialized. Rather, the most fruitful course of action would appear to be the diversification of the manufacturing sector with firms showing faster rates of employment and income growth, greater stability during periods of national economic stagnation, the greatest level of export activity and the strongest linkages with industries in the WLMA.

Firms relying on materials or products produced by fabricated metal or machinery producers (backward linkage) are probably the most likely to benefit from locating in the Region and are probably the most likely to diversify the economy. Included

in this category would be manufacturers of electric and electronic equipment, instruments and related devices, and miscellaneous manufacturing activities.

In contrast, firms providing primary metals for the fabricated metal or machinery producers (forward linkage) are not expected to grow as well, largely because this industry is strongly dependent upon distant sources for its raw materials, and consequently is expected to continue gradually shifting its operation toward the location of its raw materials in order to reduce the cost of transportation.[8] Encouraging the introduction of fast growth firms having backward linkages with fabricated metal and machinery producers should also serve to stimulate employment levels in this slow growth sector of the economy.

However, other industries with few if any linkages to the fabricated metal industry may also further the long-term objectives of diversifying the economy. A recent study, Regional Economic Diversification, identified the ten least variable industries (in terms of cyclical and seasonal variations in employment) between 1958 and 1967 as manufacturers of bakery products, commercial printing, miscellaneous publishing, miscellaneous converted paper products, paperboard containers and boxes, medical instruments and supplies, soap cleaners and toilet goods, petroleum refining, industrial chemicals and textile furnishings [except wool].[9] With the exception of petroleum refining, industrial chemicals and textile furnishings, the seven industries have a great potential for growth in the Waterbury Labor Market Area.

One of the spinoffs of diversifying the Region's manufacturing activities with more stable industries can be a reduction in the peaks of seasonal and cyclical unemployment and a greater insulation from the effects of national economic stagnation.

8. Minimization of structural unemployment

A final criteria to be considered in choosing suitable industries is the degree to which they are able to provide employment opportunities to individuals currently unable to find a job in the Waterbury Labor Market Area. The problem of structural unemployment arises when there is a mis-match between the skills of the unemployed labor force and the needs of local industry. Structural unemployment can either be the result of a rapid decline in manufacturing activities which leaves a large portion of the labor force without employment or as a result of the fact that the training of the labor force or local training programs are not consistent with the employment opportunities developing in the labor market. According to the Connecticut Department of Labor, 1,754 or 46% of the unemployed persons in the WLMA, were last employed in manufacturing during the week April 16-22, 1978.[10] Within the manufacturing group, the largest numbers of unemployed were from the primary metals industry (657 persons), fabricated metals (277 persons), and instruments (242 persons). While some of this unemployment can be attributed to seasonal variations in the level of activity in these three industries, some of it appears to reflect a long-term decline in their employment opportunities. The Connecticut Department of Labor estimates that between 1979 and 1985 there will be a nominal decline or no growth in the employment levels of those manufacturing watches, clocks and watchcases, textiles and apparel and instruments and related products.[11] Attracting industries which utilize labor skills similar to those used by these three declining industries would help the Region minimize the problems of structural unemployment. However, it should be emphasized that any strategy which attempts to optimize the secondary benefit of minimized structural unemployment may provide fewer employment opportunities than a strategy geared toward retraining the unemployed labor force for jobs in growth industries or moving the structurally unemployed to other geographic areas having greater need for their skills.

FOOTNOTES

[1]U.S. Department of Commerce, Regional Economic Development in the United States, Part II, Chapter 4, "Some Principles of Regional Economic Development" by Anthony Downs, pp. IV-3 to IV-17.

[2]Ibid., pp. IV-3 to IV-17.

[3]Ibid.

[4]Ibid.

[5]Chamber of Commerce of the United States, What New Jobs Mean to A Community, Washington, D.C., 1973, pp. 5-15.

[6]U.S. Bureau of the Census, 1972 Census of Manufactures, Connecticut.

[7]Standard and Poors, 1978 Industry Surveys.

[8]See Waterbury Republican, "Chase closing to cause taxation pinch on City," August 21, 1975 and "Scovill to sell all its plants in City," June 26, 1975 for a description of two of the major primary metal manufacturers which chose to relocate or close their plants in Waterbury.

[9]Michael Conroy, Regional Economic Diversification, Praeger Publishers, New York, NY, 1975. See Chapter 5, p. 98.

[10]Connecticut Labor Department, Employment Security Program, Annual Planning Report for Fiscal Year 1979, Waterbury, Connecticut, May 1978, pp. 17-18.

[11]Ibid, pp. 10-11.

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